PROCEDURE FOR SHIPBOARD INSTALLATION, SHOP ASSEMBLY AND ALIGNMENT OF THE TRIDENT OE-207A(V)/BR ANTENNA MAST ASSEMBLY, ANTENNA MAST ASSEMBLY CYLINDER BASE AND BEARING FRAME ASSEMBLY

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Title: PROCEDURE FOR SHIPBOARD INSTALLATION, SHOP ASSEMBLY AND ALIGNMENT OF THE TRIDENT OE-207A(V)/BR ANTENNA MAST ASSEMBLY, ANTENNA MAST ASSEMBLY CYLINDER BASE AND BEARING FRAME ASSEMBLY

After the attached enclosures have been inserted, record this change on the Change Record Sheet and insert this change guide immediately following the List of Effective Pages.

Remove the following pages and replace with new change pages attached. Dispose of superseded pages in accordance with applicable regulations.

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Insert the copy of the TECHNICAL MANUAL DEFICIENCY/EVALUATION REPORT TMDER) (NAVSEA 9086/10) supplied with this change package between the last text page and the back cover.

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CERTIFICATION STATEMENT

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CHANGE RECORD

Change No.	Date	Title and/or Brief Description	Signature of Validating Officer

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FOREWORD

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I - GENERAL INFORMATION

1-1 INTRODUCTION

a. Purpose. This document establishes a standard assembly and alignment procedure to assure uniform assembly of the Trident OE-207A(V)/BR Antenna Mast Assembly.

b. Scope. This document defines the faired mast assembly, erecting and retracting mechanism and antenna radome assembly, references applicable documents and provides step-by-step procedures for shop assembly and alignment. It is applicable for all Trident Class Ships equipped with OE-207A(V)/BR Antenna Mast Assemblies.

1-2 EQUIPMENT DESCRIPTION

a. Faired Mast Assembly. The faired mast assembly houses and supports the telescoping antenna assembly, erecting and retracting mechanism, piston rod bracket, cylinder steady bearing bracket, antenna radome bearing assembly, and antenna cable roller assembly.

b. Erecting and Retracting Mechanism. The erecting and retracting mechanism consists of four wire rope assemblies, adjustable erecting and retracting sheave assemblies, and anchor points for wire rope terminal ends located on the antenna lower bearing assembly and base plate assembly on top of the hoist cylinder upper bushing.

c. Antenna Radome Assembly. The Trident OE-207A(V)/BR Antenna Unit consists of a tear drop epoxy fiberglas radome which houses a modular constructed antenna assembly. The bottom of the assembly contains a connector to which the electrical connection is made. The antenna radome mounts on the antenna radome lower bearing assembly and is moved by action of the erecting and retracting wire rope cable assemblies.

d. Hydraulic Hoist Cylinder Assembly. The hydraulic hoist cylinder assembly in conjunction with the mechanical erecting and retracting mechanism, raises and lowers the antenna and faired mast assembly.

1-3 REFERENCES

(1) Code Ident 78741, HITCO Dwg 9000501
(2) SSBN 726-445-4491191, OE-207/BR Installation Standard Top Drawing
(3) SS-522-4491149, Inner Mast Upper Bearing Assembly
(4) SS-522-4491158, Adjustable Erecting Sheave Assembly
(5) SS-522-4491146, Hoist Cylinder Mounting Bracket
(6) SS-522-4491147, Hoist Cylinder Steady Bearing (Assy. No. 1)

1-3 REFERENCES (Continued)

(7) SS-522-4491159, Adjustable Retracting Sheave Assembly
(8) AS-3076A(V)/BR, Antenna Radome Assembly
(9) SS-522-4491155, Inner Mast Lower Bearing Assembly (Assy. No. 4)
(10) SS-522-4491151, Erecting & Retracting Cable Assembly ("D" Type Set 1)
(11) SS-522-4491153, Cable Guide Sheaves and Support Bracket Assembly & Details
(12) NAVSEA SE110-BK-MMO-010, Painting Fiberglas Masts & Radomes & Camouflaging Submarine Faired Masts
(13) SS-585-4398602, Hydraulic Cylinder Assembly & Detail 2 Position, Differential Raise (Assy. 2)
(14) SS-128-4398597, Closure Caps
(15) SS-426-4491157, Bearing Assembly & Details for Main Mast
(16) NAVSEA 0900-LP-017-6000, Engineering Standard for the Trident OE-207A(V)/BR Antenna Mast Assembly

1-4 SPECIAL TOOLS REQUIRED

a. One Keuffel & Esser Alignment Telescope, 712022 (or equivalent)
b. One Keuffel & Esser Mirror Target, 716250 (or equivalent)
c. One centerline fixture
d. One Disc (4-1/2 inch dia. x 1/16 inch aluminum)
e. One tension meter (200 to 1000 pounds) Pacific Scientific Co., Anaheim, California (or equivalent)

1-5 GENERAL INSTRUCTIONS

a. All mating surfaces to be free of foreign matter, burrs, gouges and/or scoring.

b. Keep foreign matter out of open hydraulic lines and ports by covering them with clean protective caps.

c. Piece numbers noted by themselves are associated with the drawing referenced in each paragraph title.

II - FAIRED MAST SHOP ASSEMBLY

2-1 FAIRED MAST, REF. (1)

NOTE

Prior to installing components, the faired mast shall be inspected; all inspection data documented and inspection records kept on file. It shall meet requirements of Ref. (1) and Ref. (2).

LIST OF EFFECTIVE PAGES

Note: The portion of text affected by the change is indicated by vertical bars in the outer margin of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

Date of issue for original and changed pages page are:

Original	01 July 1977
Change 1	01 April 1978
Change 2	Never Issued
Change 3	30 October 1993

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a. Datum Lines

Step 1. Establish centerlines for the major and minor axes of the faired mast and centerline of the hoist cylinder on the top and bottom ends of the faired mast. The fixture depicted in Figure 1-3 is used for accomplishing this step.

b. Adjustable Erecting Sheave Assembly, Ref. (4) Figure 1-5

Step 1. Assemble the upper sheave bracket, Pc. 4, by securing bumpers, Pc. 12, with eight (8) flat head screws, Pc. 13.

Step 2. Press the bushings, Pc. 22, into the sheave, Pc. 21; place sheaves into the clevis, Pc. 11, and insert pins, Pc. 23, through the clevis and the sheaves and lock pins, Pc. 23 with set screws, Pc. 24.

NOTE

(a) Machine the bushing, Pc. 22 to provide 0.005 to 0.010 inch end play with the clevis, Pc. 11

(b) Bushing to have a 0.003 to 0.007 inch diametrical clearance with the pin, Pc. 23.

(c) Coat the threads of the hex head bolt, Pc. 15 with Molykote "G" or "U".

Step 3. Place the clevis, Pc. 11, into the retracting sheave bracket, Pc. 4; thread the hex head bolt, Pc. 15, with P.V.C. flat washer, Pc. 16, through the bracket and into the clevis, Pc. 11. Maintain 0.75 inch between the clevis and the bracket.

Step 4. Place the hinge arm, Pc. 34 into erecting sheave bracket, Pc. 4, and erecting hinge bracket, Pc. 27.

Step 5. Hold the adjustable erecting sheave for final assembly.

Step 6. Insert pins, Pc. 30 into each bracket, place flat washers on pins, Pc. 30 and install cotter keys, Pc. 32.

c. Hoist Cylinder Mounting Bracket, Ref. (5)

NOTE

The following seven (7) steps are to be accomplished by the manufacturer.

Step 1. Press-fit/locating pin, Pc. 9, into the piston rod mounting bracket, Pc. 3.

Step 2. Remove access cover, Ref. (1), Pc. 19, from the starboard side of the faired mast.

Step 3. Install the bracket, Pc. 3, on the center channel and temporarily secure the bracket with four (4) screws, Pc. 16, four (4) washers; Pc. 18, and four (4) nuts, Pc. 17.

Step 4. Install the target mirror (Keuffel & Esser, 716250 or equivalent), on the piston rod mounting bracket, and carefully install the bracket and the mirror on the center channel of the faired mast.

Step 5. Align the piston rod mounting bracket so that the vertical and the horizontal line of the target mirror coincides with the optical line of sight.

Step 6. Re-focus the telescope to the target mirror to ensure that the center location of the target is within $\pm$ 0.025 inches of the line of sight.

Step 7. Align the piston rod bracket so that the target mirror is perpendicular within 0.005 inches per foot to the optical line of sight. Focus the alignment telescope on the target mirror until the telescope's auto reflected target image is revealed with the reticle pattern. The center of the auto reflected image must fall within 0.250 inches to the reticle center when the alignment telescope is 25 feet from the target mirror.

d. Hoist Cylinder Steady Bearing Bracket, Ref. (6) Figure 1-6

Step 1. Establish the centerlines of the faired mast and the hoist cylinder on the bearing frame, Pc. 3.

Step 2. Position the bearing frame against the lower end of the faired mast so that the centerlines on the bearing frame align with the centerlines of the faired mast established in Para 2-1b. Scribe the inside contour of the faired mast onto the bearing frame.

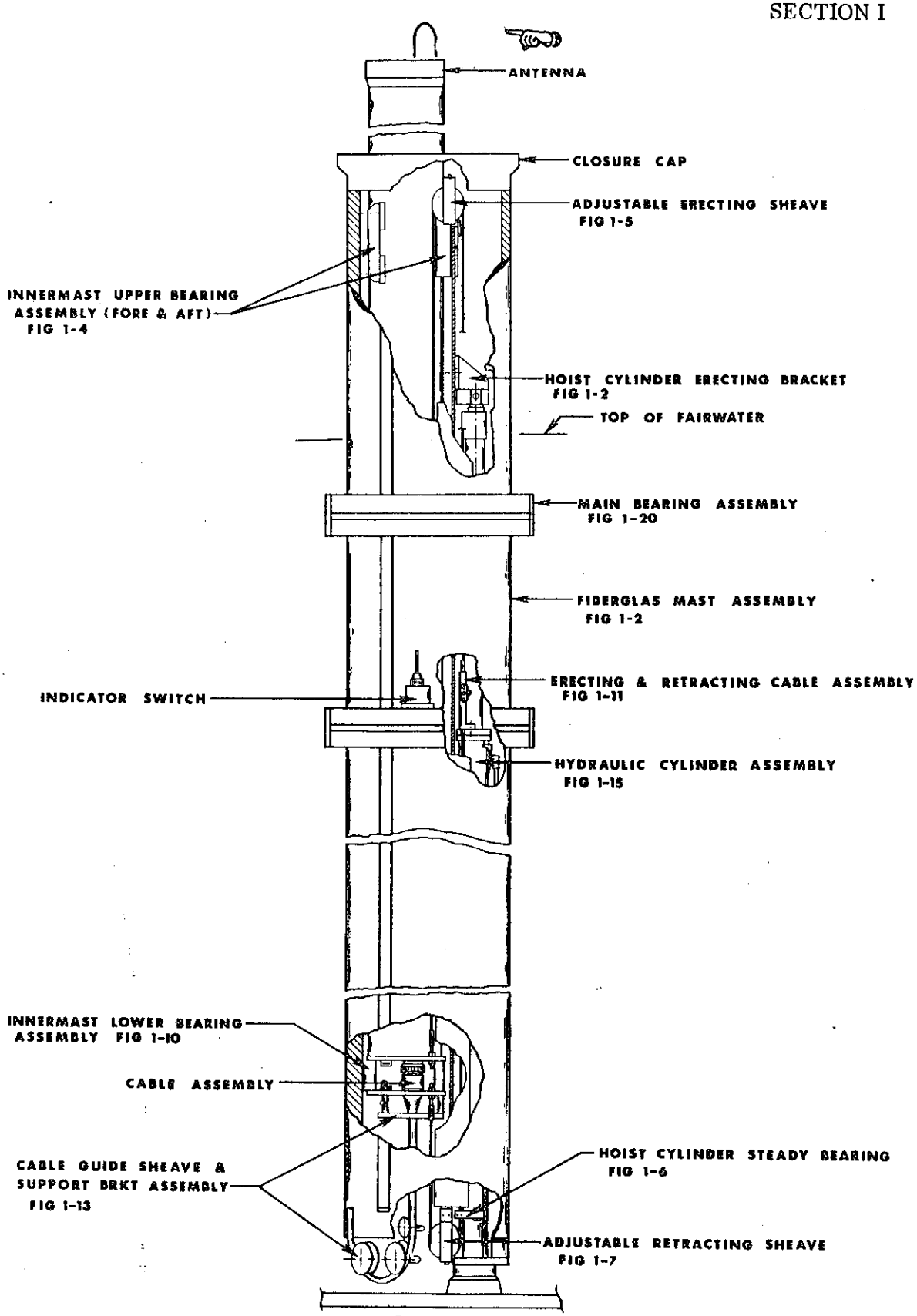


FIG 1-1

OE-207A(V)/BR MAST ASSEMBLY ELEVATION

NOTE:

1) All components are pre-assembled, except the Hoist Cylinder Steady Bearing Assembly that must be aligned to the Hoist Cylinder Mounting Bracket.

2) Mid-bearings are adjusted by shims and may require adjustment at mast refurbishment which is covered in this procedure.

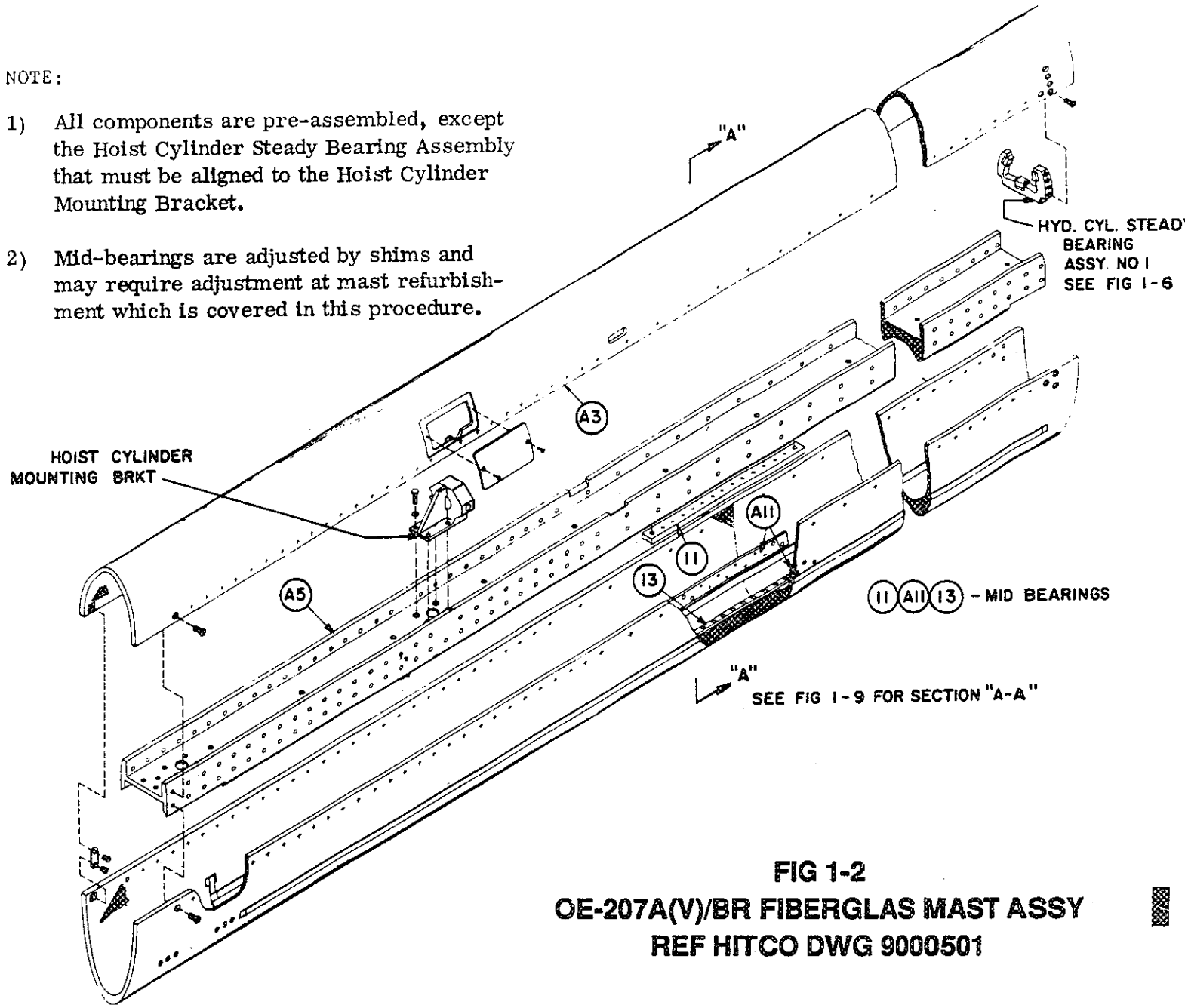


FIG 1-2
OE-207A(V)/BR FIBERGLAS MAST ASSY
REF HITCO DWG 9000501

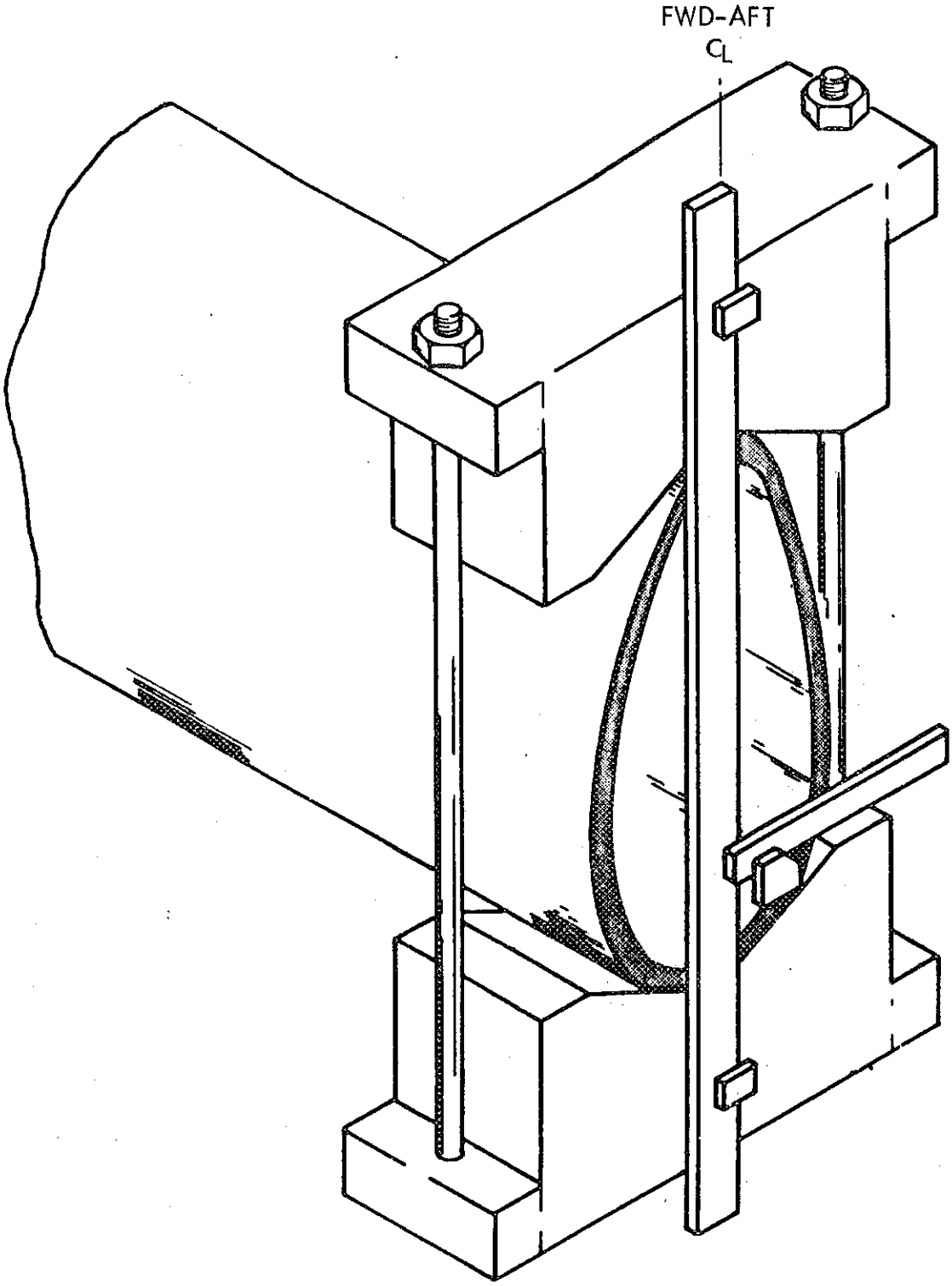


FIG 1-3 CENTERLINE F XTURE

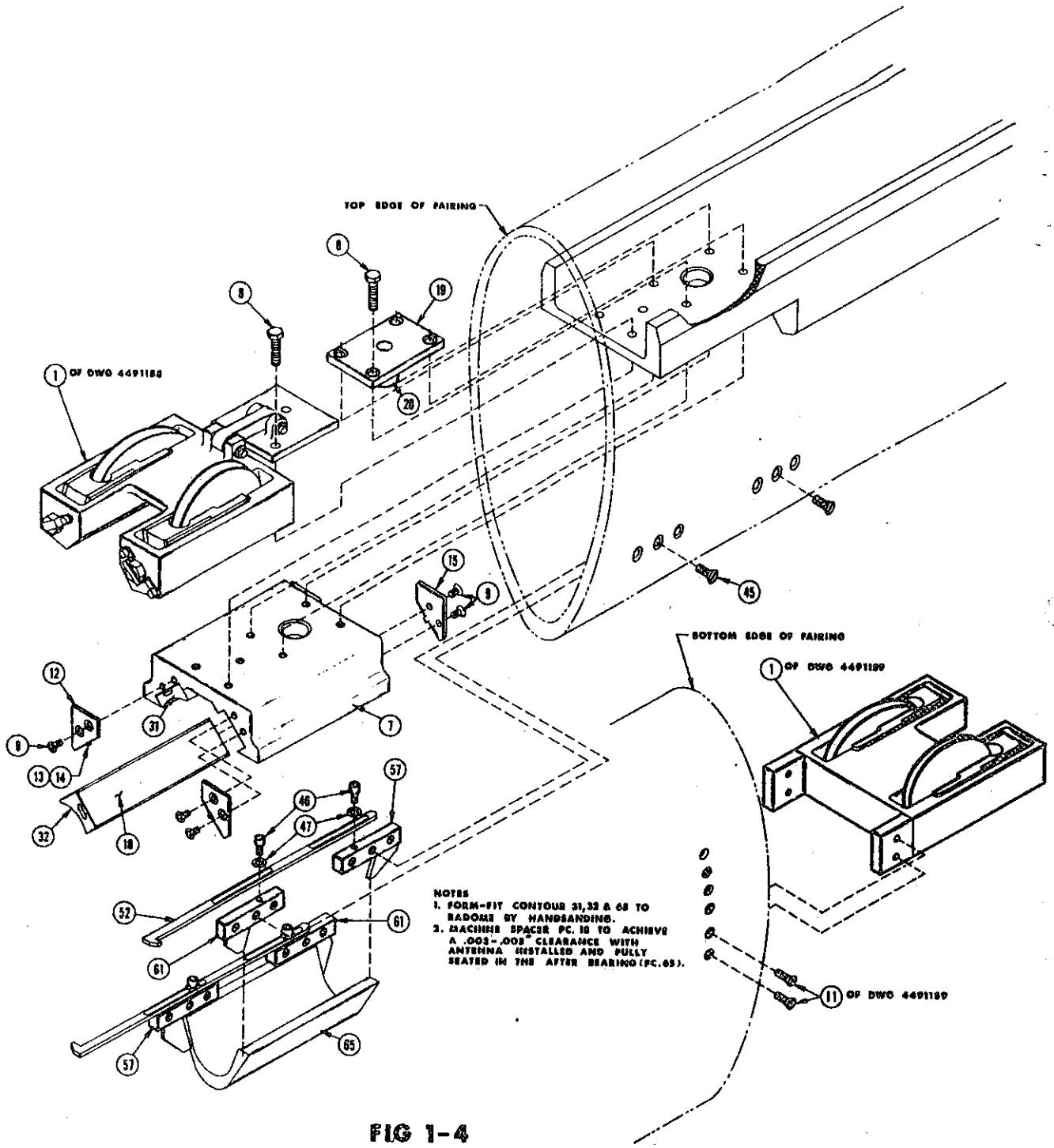


FIG 1-4
INNER MAST UPPER BEARING ASSEMBLY (FORE & AFT)
&
ERECTING & RETRACTING SHEAVE INSTALLATION
REF DWG 4491149

1) Use this view as a guide for assy/disassembly of the Erecting Sheave.
2) Special Instructions:
   a. Machine Bushing, Pc. 22 to provide 0.005" to 0.010" end play with the Clevis, Pc. 11.
   b. Bushing, Pc. 22 to have a 0.003" to 0.007" diametrical clearance with Pin, Pc. 23.
   c. Coat threads of Hex Hd. Bolt, Pc. 15 with Molykote "G" or "U".
   d. Size and final thickness of Shims, Pc. 14 shall be determined at installation to provide a total of 0.020" to 0.030" clearance between inside cavity of the Bracket, Pc. 4 and the outside surface of the Bumper, Pc. 12.
   e. Shim, Pc. 14 to be drilled using Bumpers, Pc. 12 as templates.

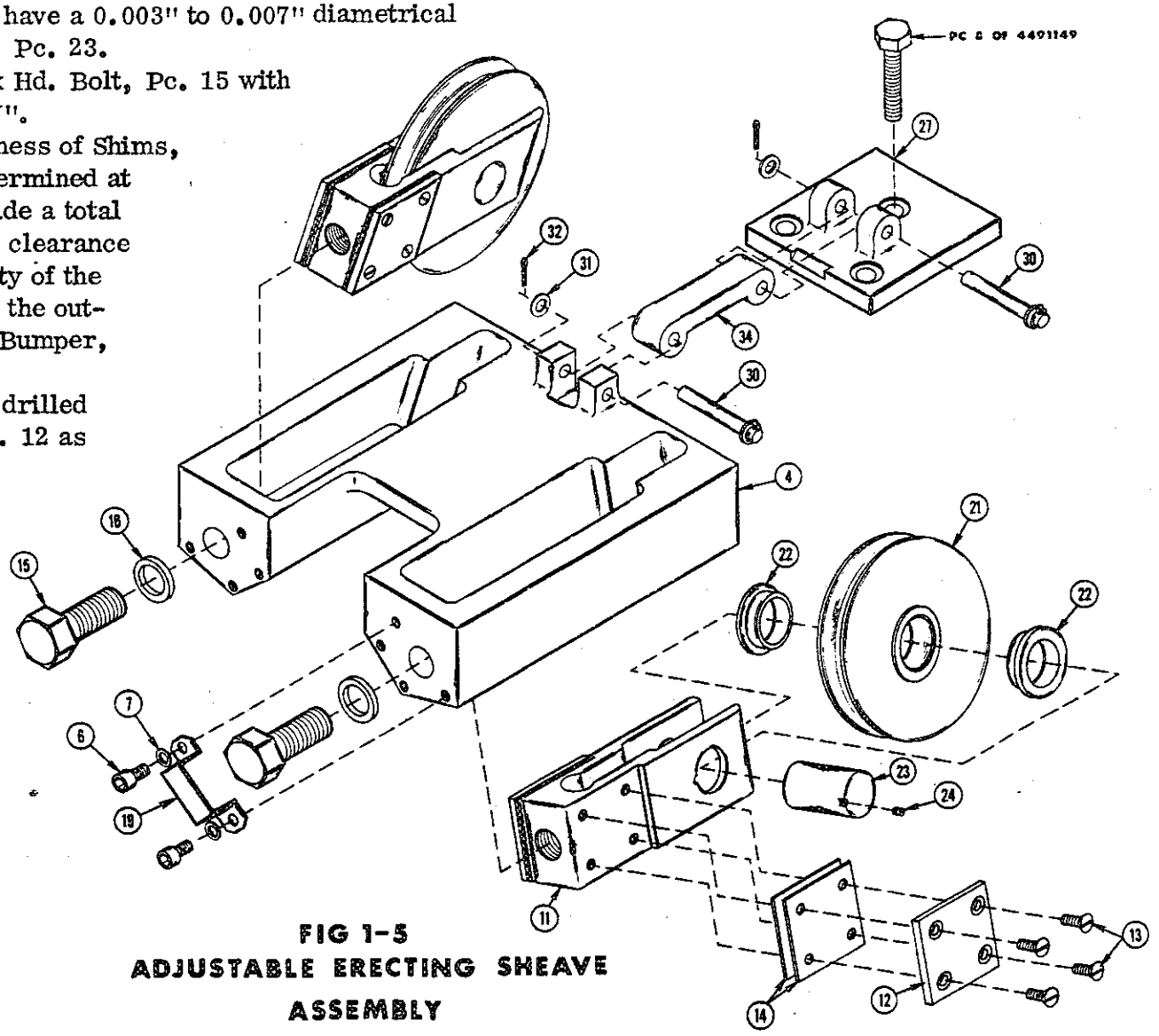
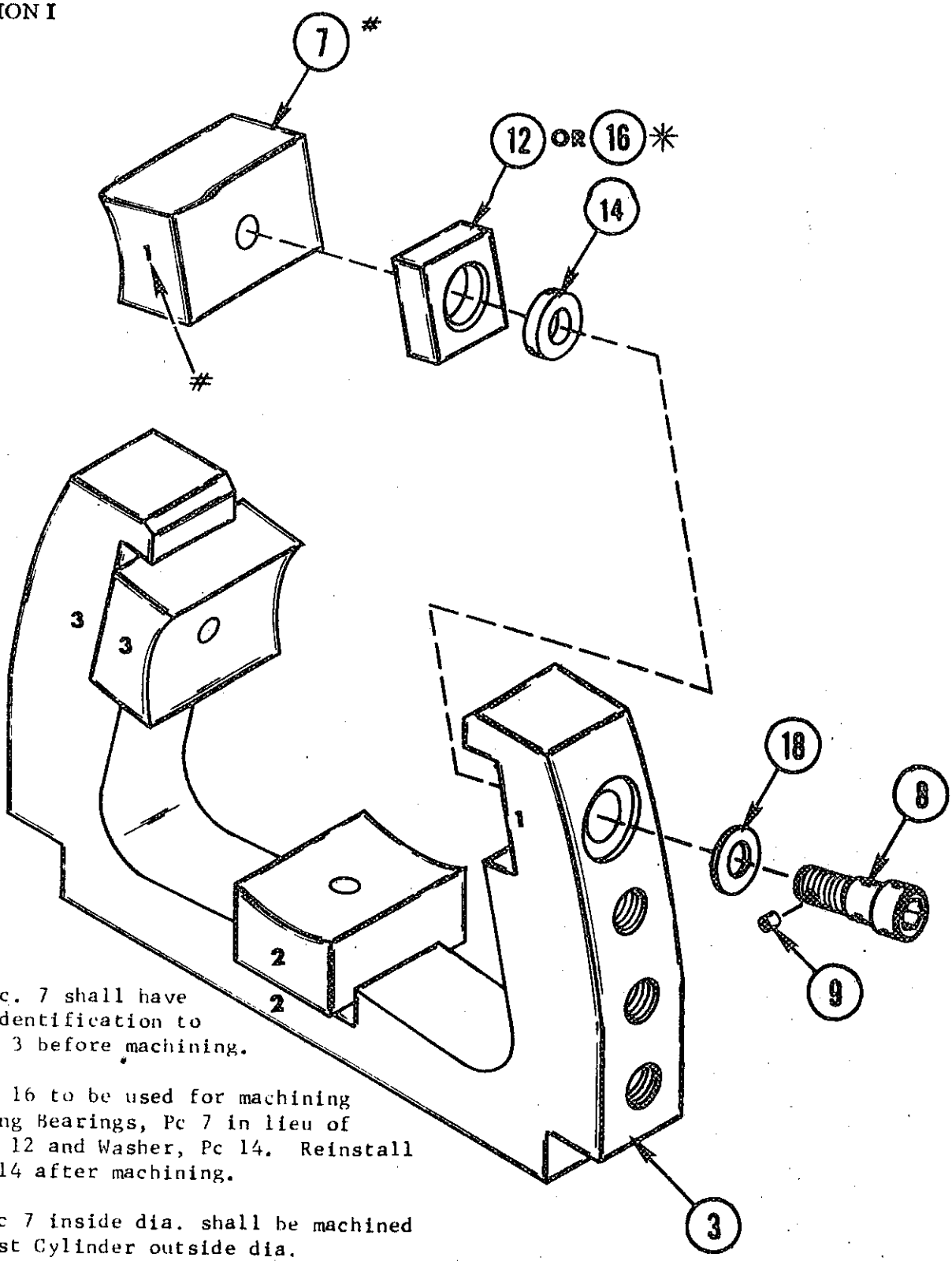


FIG 1-5
ADJUSTABLE ERECTING SHEAVE ASSEMBLY
REF DWG 4491158



NOTE:

#Bearing, Pc. 7 shall have marking indentification to Frame, Pc. 3 before machining.

✳Spacer, Pc 16 to be used for machining and aligning Bearings, Pc 7 in lieu of Spring, Pc 12 and Washer, Pc 14. Reinstall Pc 12 and 14 after machining.

Bearing, Pc 7 inside dia. shall be machined to the Hoist Cylinder outside dia.

FIG 1-6
HOIST CYLINDER STEADY BEARING ASSEMBLY
REF DWG 4491147

Step 3. Machine the cylinder bearing frame, Pc. 3, to the scribed lines of the faired mast contour. Allow a sufficient amount of metal to remain for hand fitting.

Step 4. Position the bearing frame, Pc. 3, 4.12 inches from the bottom edge of the faired mast. Align the bearing frame centerlines with the faired mast centerlines and then align the bottom face of Pc. 3 perpendicular within three (3) minutes of arc of the hoist cylinder operational centerline.

NOTE

See Paragraph 2-3 for the alignment telescope set-up. Clamp the bearing frame to the faired mast, maintaining alignment.

Step 5. Secure the bearing frame to the faired mast with Pc. 4. Screws are to be recessed a minimum of 1/32 to a maximum of 1/16 of an inch below the surface of the faired mast.

Step 6. Install and secure the spacer, Pc. 16, (0.275 to 0.280 thick) and the bearing, Pc. 7, to the bearing frame with Pc. 8.

e. Adjustable Retracting Sheave Assembly, Ref. (7) Figure 1-7

Step 1. Assemble the lower sheave bracket, Pc. 4, by securing the bumper, Pc. 18, with eight (8) flat head screws, Pc. 19.

Step 2. Press the bushings, Pc. 28, into the sheave, Pc. 27. Place the sheaves into the clevis, Pc. 17, and insert the pins, Pc. 29, through the clevis and sheaves and lock pins, Pc. 29 with the set screw, Pc. 30.

NOTE

(a) Machine the bushing, Pc. 28 to provide 0.005 inch to 0.010 inch end play with the clevis, Pc. 17.

(b) Bushing to have a 0.003 to 0.007 inch diametrical clearance with the pin, Pc. 29.

(c) Coat the thread of the hex head bolt, Pc. 21, with Molykote type "G" or "U".

NOTE:

1) Use this view as a guide for assembly/disassembly of the Retracting Sheave.
2) Special Instructions:
   a) Machine the Bushings, Pc 28 to provide .005" to .010" end play with Clevis, Pc 17.
   b) Bushings, Pc 28 to have .003" to .007" dimetrical clearance with Pin, Pc 29.
   c) Coat the threads of Hex Hd Bolt, Pc 21 with molykote "G" or "U".
   d) Size and final thickness of Shims,(Pc 20) shall be determined at installation to provide a total of .020" to .030" clearance between the inside cavity of Bracket, Pc 10 and outside surface of Bumper, Pc 18.
   e) Shims, Pc 20 to be drilled using Bumpers, Pc 18 as Template.

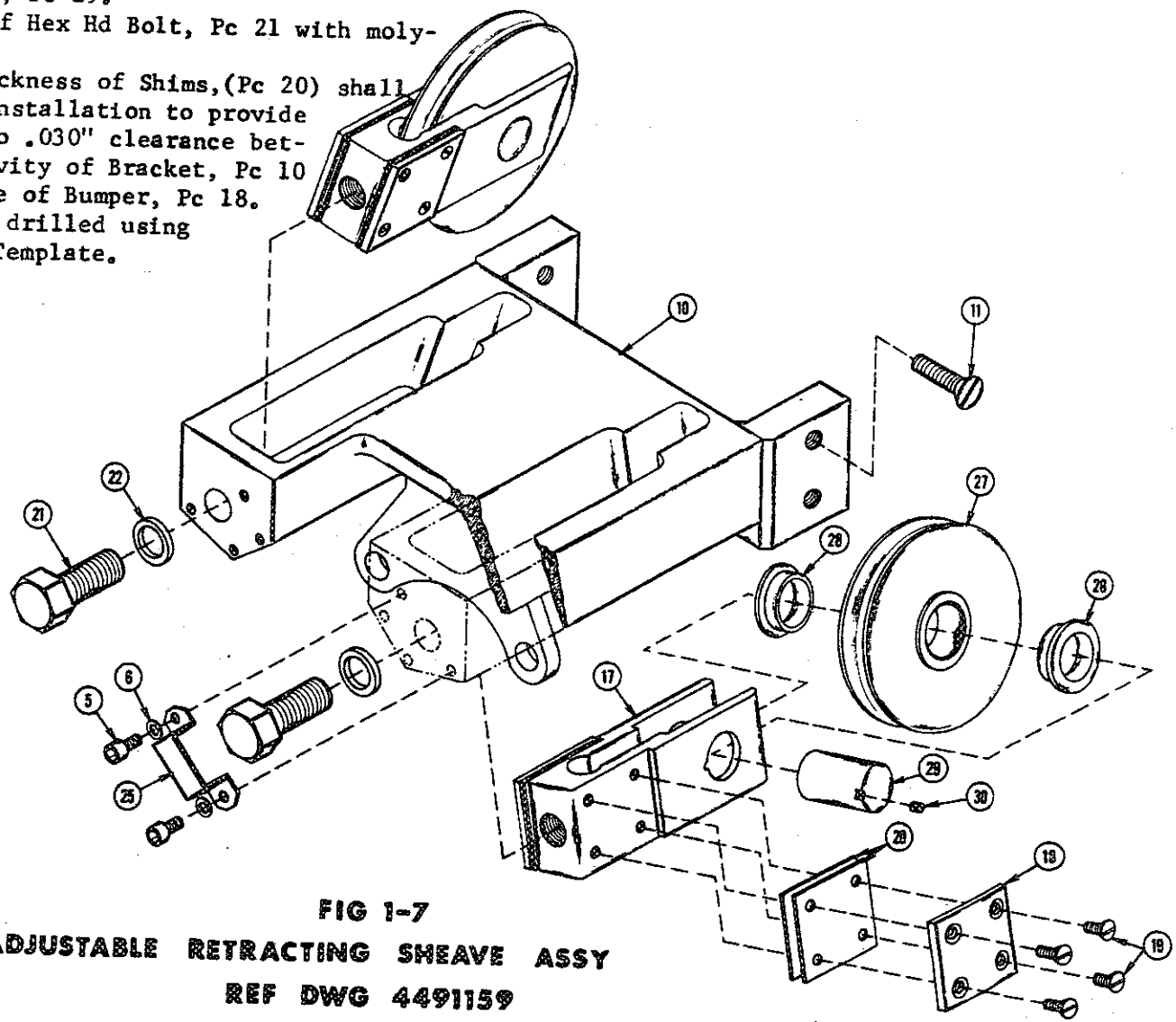


FIG 1-7
ADJUSTABLE RETRACTING SHEAVE ASSY
REF DWG 4491159

Step 3. Thread #10-32-UNF-2A Set Screw, Pc. 30 into the pin, Pc. 29 and clevis, Pc. 17.

NOTE

Parts are to be match-marked and staked at assembly.

Step 4. Place the clevis, Pc. 17 into the retracting sheave bracket, Pc. 4. Thread the hex head bolt, Pc. 21 with P. V. C. flat-washer, Pc. 22, through the bracket and into the clevis, Pc. 17. Maintain 0.75 inch between the clevis and the bracket.

Step 5. Hold the retracting sheave for final assembly.

2-2 ALIGNMENT

a. Hydraulic Hoist Cylinder Steady Bearing Bracket, Ref. (6) Figure 1-6

Step 1. Place the faired mast in chock supports with the forward bearing area (leading edge) up.

Step 2. Install on the bottom end of the faired mast one (1) taut line (thread) to coincide with the datum lines established in paragraph 2-1b. Secure the lines to the faired mast with the masking tape.

Step 3. Set-up the alignment telescope (Keuffel & Esser, 712202 or equivalent) at the bottom end of the faired mast at least 25 feet from the piston rod mounting bracket in the faired mast.

Step 4. Align the telescope's line of sight to coincide with the intersecting thread lines on both ends of the faired mast.

NOTE

The vertical and horizontal micrometer displacement line of sight knobs on the alignment scope to be set at zero.

Step 5. Position the 4-1/2 inch diameter by 1/16 inch thick aluminum disc against the bottom of the bearing shoes in the hoist cylinder steady bearing bracket.

Step 6. Align the disc center to be within 0.025 inches of the aligned optical line of sight, and scribe the circumference of the aligned disc onto the bearing shoes.

Step 7. Remove the hoist cylinder steady bearing assembly from the faired mast and bore the bearing shoes to a maximum diameter of the hoist cylinder tube and concentric to the established layout. Identify the shoe, Pc. 7, with respective recess on Pc. 3 by hand stamping each with a unique mark so that the shoes cannot be interchanged. Marking to be visible from the bottom of the assembly when installed in the mast. The bored shoe surface shall be perpendicular to the bottom face of the hoist cylinder bearing frame.

NOTE

Chamfer the center tapped holes in the bearing shoes, and radius all bearing edges 1/16 of an inch.

Step 8. Reinstall and secure the machined cylinder steady bearing assembly in the faired mast.

Step 9. Remove Pcs. 7, 8, and 16, Ref. (6), to facilitate installation of the hydraulic hoist cylinder.

Step 10. Install the hydraulic hoist cylinder assembly through the steady bearing frame, and install Pcs. 7, 8, 12, 14 and 18, Ref. (6), to the steady bearing frame.

Step 11. Install the piston rod into the piston rod mounting bracket. (Do not install connecting pin).

Step 12. Rotate or retrace the piston rod approximately one inch from the piston rod mounting bracket to ensure there is no binding. Push the piston rod back into the piston rod mounting bracket.

NOTE

There shall be no binding when removing and reinstalling the piston rod into the piston rod mounting bracket.

Step 13. Remove the hydraulic hoist cylinder assembly from the faired mast and hold for final assembly.

NOTE

The hoist cylinder steady bearing components must be removed.

2-3 INSTALLATION OF FAIRED MAST MID-BEARINGS HITCO Dwg 9000501, Figures 1-8 and 1-9

NOTE

The following procedure shall be used when it becomes necessary to use shims to effect alignment.

Step 1. Place the faired mast with leading edge down in supporting chocks.

Step 2. Scribe the antenna athwartships centerline on each end of the faired mast. (See Figure 1-8.)

Step 3. Tape thread on scribe lines forward/aft and athwartships on each end of the faired mast.

Step 4. Set an alignment telescope twenty-five (25) feet from the faired mast and align to the antenna centerline.

Step 5. Remove the thread line (telescope end) and install the forward mid-bearing (11) with 1-32 socket head screws.

Step 6. Place the alignment fixture in the faired mast on top of the mid-bearing. Align the fixture athwartships through the faired mast mid-side bearing screw holes.

Step 7. Determine the amount of shims that will be required beneath the forward mid-bearing.

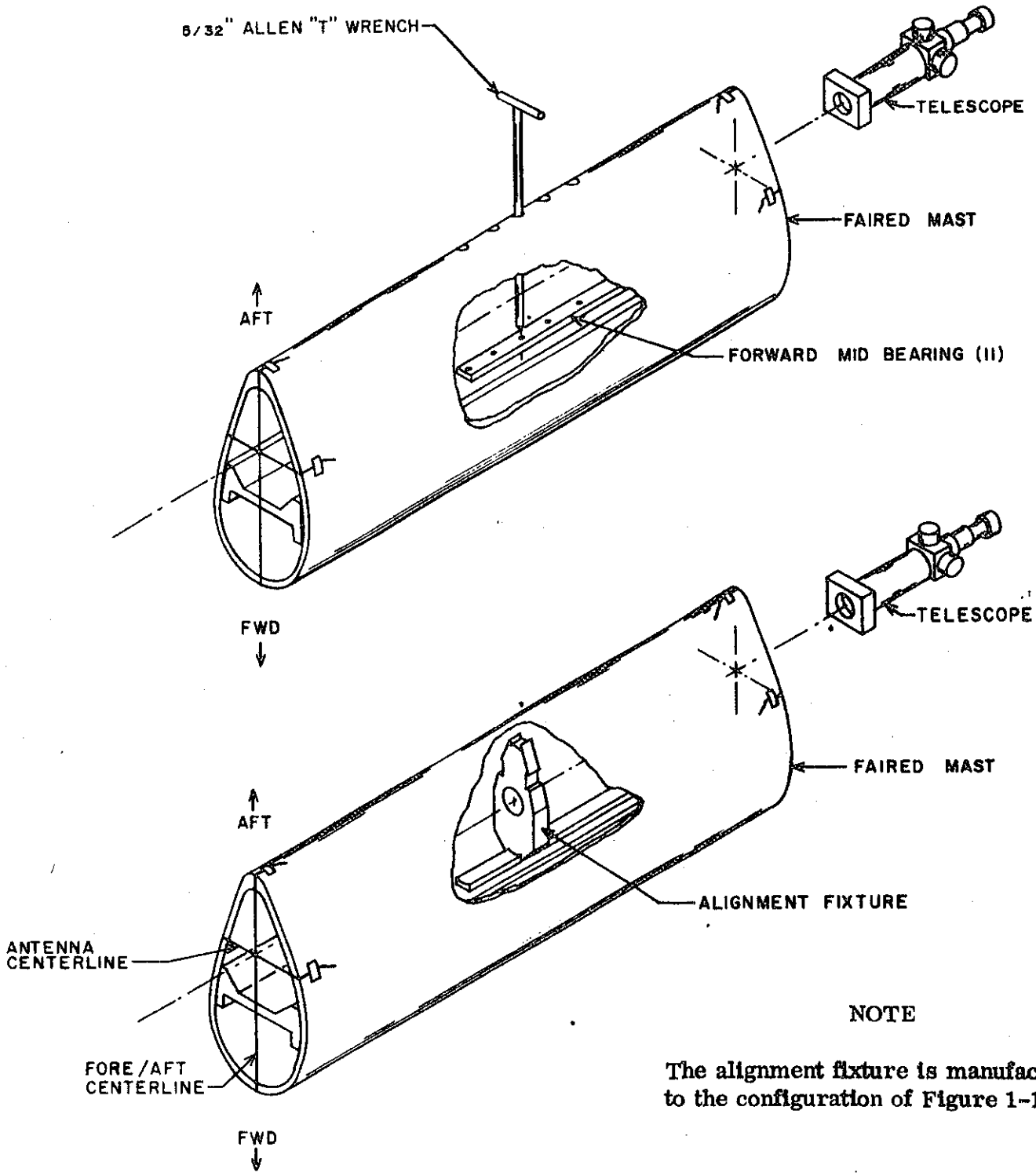
Step 8. Take depth micrometer readings through the faired mast side bearing securing holes and record.

Step 9. Measure the crown thickness of all the mid-side bearings, Pc. A-11. The difference between the crown thickness and the recorded reading, Step 8 shall be the shim size minus the 0.015 inch to 0.020 inch clearance. (See Figure 1-8.)

Step 10. Repeat Step 8 and Step 9 for the after mid-bearing, Pc. 13.

NOTE

The faired mast is to be rotated; the trailing edge down when installing the after bearing.



NOTE

The alignment fixture is manufactured to the configuration of Figure 1-13.

FIG 1-8

ANTENNA RADOME FORWARD MID-BEARING ALIGNMENT

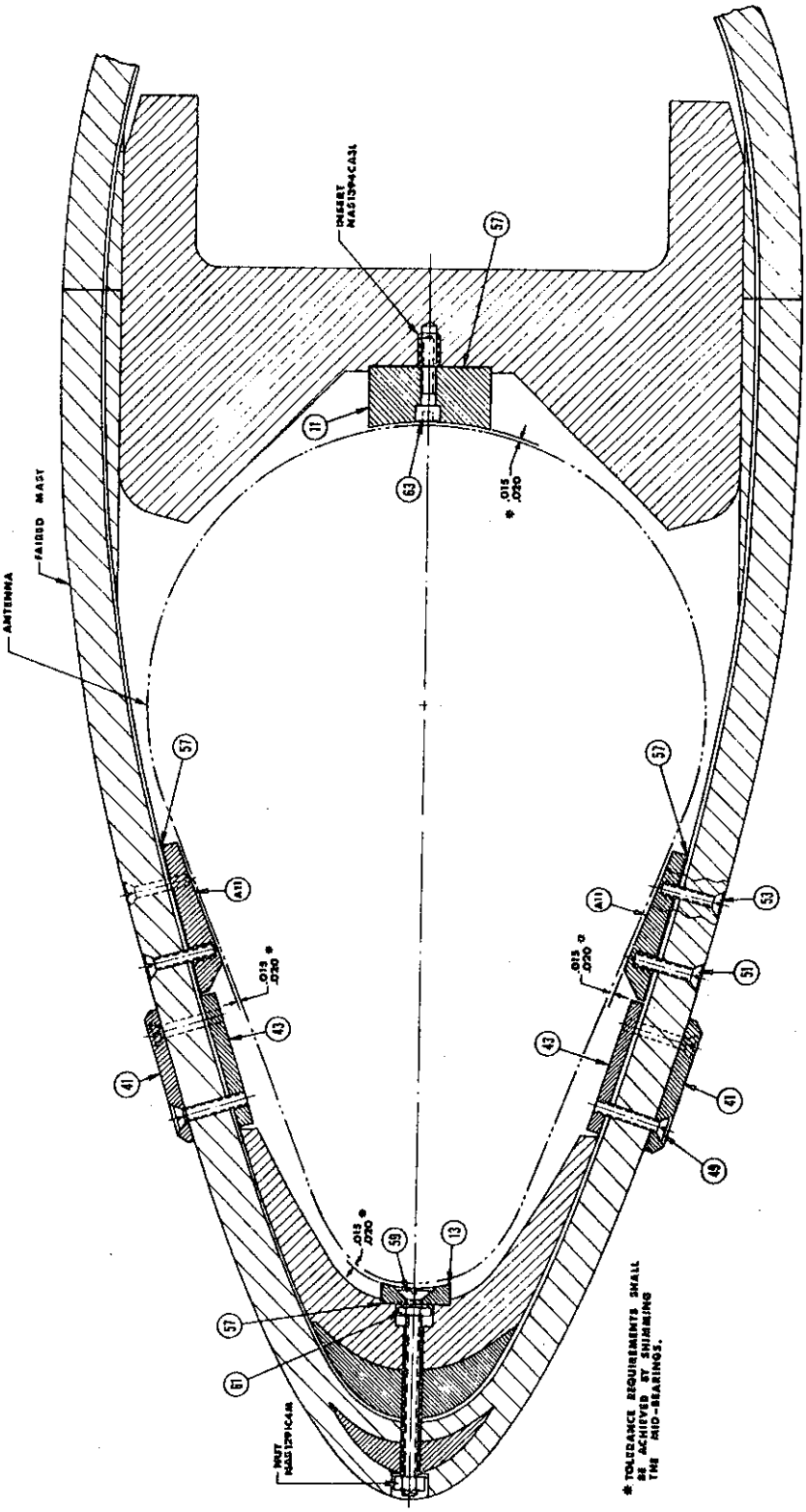


FIG 1-9
MAST CROSS-SECTION, SHOWING MID-BEARINGS & GROUNDING STRIPS

2-4 INSTALLATION OF THE MID-SIDE BEARINGS

NOTE

The following procedure shall be used for installing the mid-side bearings if not previously performed by the manufacturer.

Step 1. Place the faired mast with either side laying down on support blocks to allow 10 inches of clearance beneath the faired mast.

Step 2. Slide the side bearing into the faired mast and after cavity until the side bearing screw holes align to the pre-drilled holes in the mast.

Step 3. Start with the center holes when installing the 8-32 and/or 10-32 flat head screws and work outward.

Step 4. Turn the mast over and repeat Steps 1 through 3.

III - ANTENNA RADOME ASSEMBLY

3-1 ANTENNA RADOME, REF. (8)

NOTE

Prior to installation of the faired mast components, the antenna radome shall be inspected. All inspection data shall be documented and records kept on file. The radome shall meet all requirements of Ref. (2) and Ref. (8).

a. Datum Lines

Step 1. Scribe the fore/aft and athwartships centerlines of the radome on the perimeter of the radome base. Ref. (8).

3-2 ASSEMBLY AND INSTALLATION OF COMPONENTS

a. Antenna Radome Lower Bearing Assembly, Ref. (9) and Upper Bearing Shoe, Ref. (3)

Step 1. Measure the depth relief in the upper aft interval end of the faired mast and record and designate this dimension "A".

NOTE:

1) Scraper, Pc 38 & Spring, Pc 27 shall have .090" compression (Pre-load) against the Mast Internal Grounding Strip.
2) Screws, Pcs 9 & 15 shall be safety wired.
3) Grind Screw, Pc 21 flush, if protruding beyond Bearing, Pc 23.
4) Tighten Screw, Pc. 21 barely snug, then back-off 1/8" turn.
5) For additional information, see text and/or dwg 4491155.

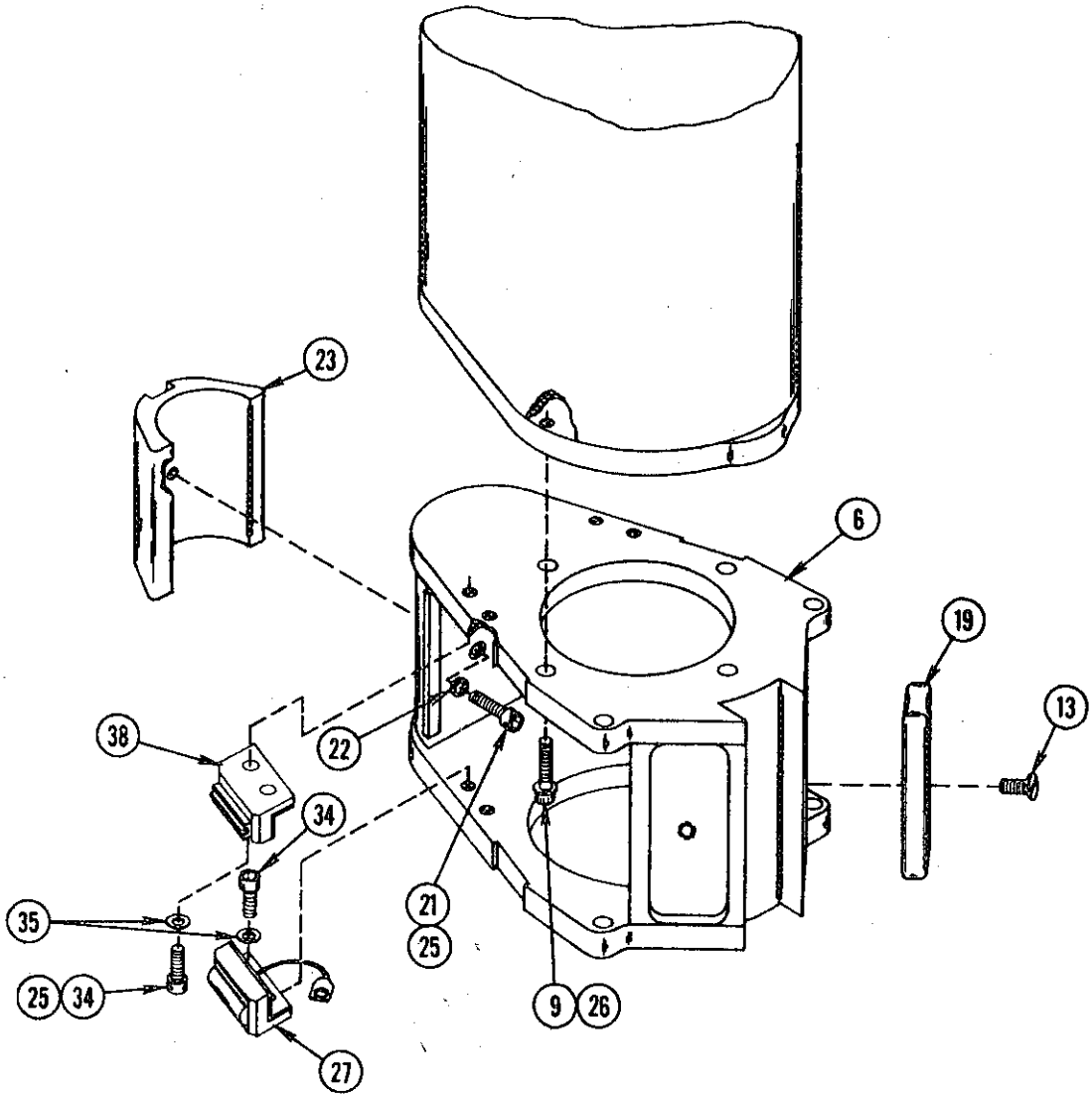


FIG 1-10

INNER MAST LOWER BEARING ASSEMBLY

REF DWG 4491155

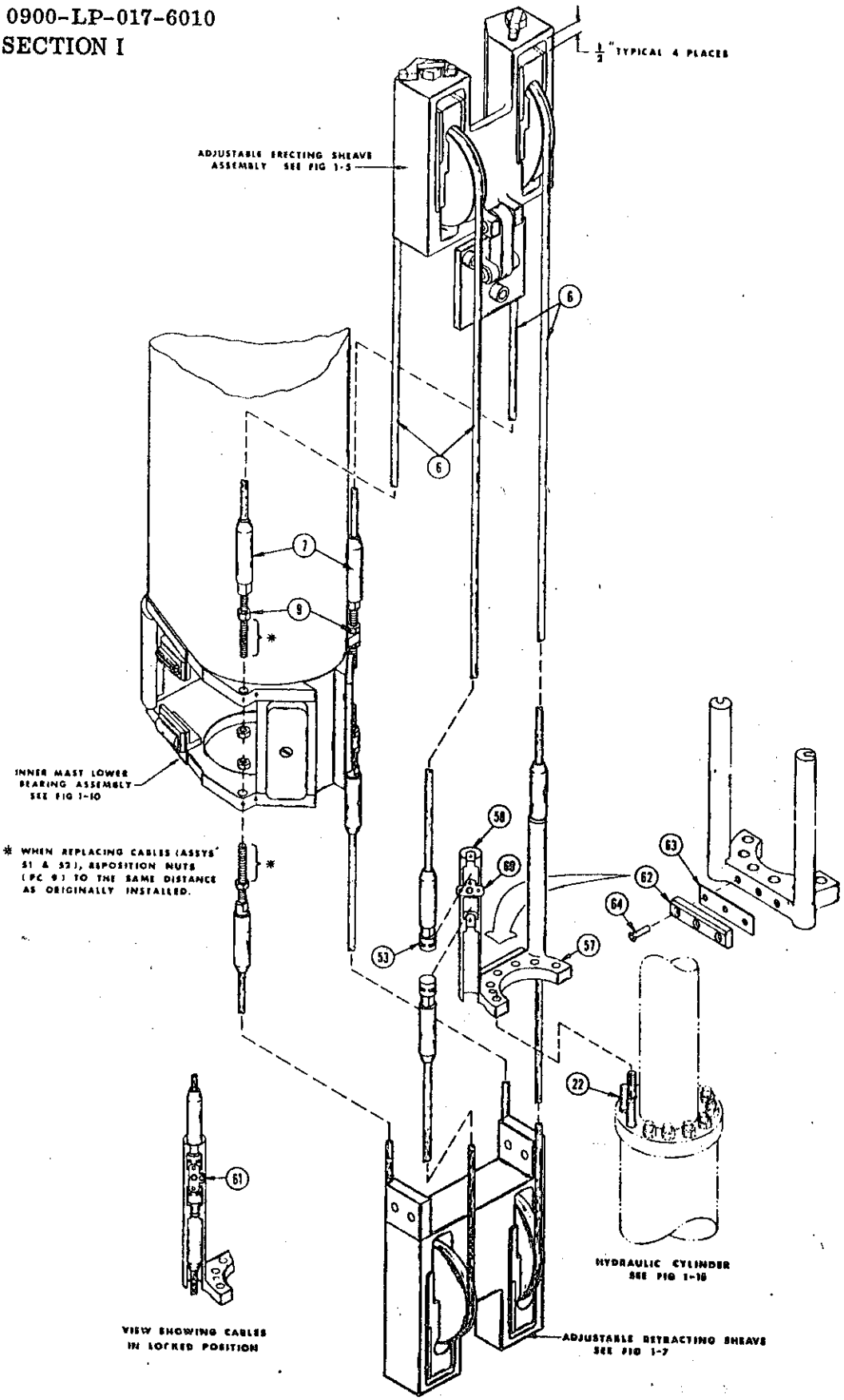


FIG 1-11
ERECTING & RETRACTING CABLE ASSEMBLY
REF DWG 4491151

NOTE

(a) To maintain a parallel condition between the antenna radome trailing edge, and the inner aft bearing surface of the faired mast, Ref. (1), the aft shoe, Ref. (9), on the lower bearing assembly and the upper aft bearing shoe must be fitted to each other and to their respective mast surfaces.

(b) All bearing shoe surfaces shall show a 50% minimum contact, uniformly distributed with its mating and/or sliding surface.

Step 2. Machine and fit the upper aft bearing shoe to the contour of the radome trailing edge and to the contour of the relief surface of the faired mast. A fitted bearing shoe must position the radome so its major chord will coincide with the major chord of the faired mast. When the shoe is nested in the faired mast, the radome interface side must be parallel within 0.002 inch to the balance of the aft bearing area of the faired mast.

Step 3. Mark the reference lines on the major chord and a pilot centerline on the perimeter of Pc. 8, Ref. (9).

Step 4. Mark the reference lines on the major chord and a pilot centerline on the perimeter of the radome bottom plate.

Step 5. Align and secure the lower bearing assembly, Ref. (9), to the bottom plate of the radome with tension head bolts, Pc. 9.

Step 6. Position the radome horizontally with its trailing edge up.

Step 7. Place the fitted upper aft bearing on the trailing edge of the radome adjacent to the sled.

Step 8. Position a straight edge contacting the top of the upper aft bearing shoe and parallel to the trailing edge of the radome. Let the straight edge overhang the bearing shoe and straddle the lower bearing assembly. (See Figure 1-12.)

Step 9. Measure the shortest distance between the straight edge and the top of the curved surface where the lower bearing assembly shoe will nest. Dimensions "R" will be the crown thickness of the lower bearing shoe.

Step 10. Subtract the dimensions "A" from "B" and the difference shall be the thickness of the fitted lower bearing shoe.

Step 11. Machine and fit the lower bearing aft bearing shoe within +0.010 inch of the calculated thickness (Step 10). The outside surface of the fitted shoe shall be parallel within 0.005 inch to the radome surface. The major chord of the radome surface and the major chord of the faired mast must coincide upon completion of fitting and securing the shoe to the lower bearing assembly.

Step 12. Secure the aft lower bearing shoe with Pcs. 21, 22 and 25, Ref. (9) to the lower bearing assembly and lockwire the screws. The screws shall be backed off two (2) full turns from being tight when lockwired.

Step 13. Remove the lower bearing assembly from the radome and position it in the faired mast at the smallest opening through which it will travel.

(a) Position the faired mast horizontally with its leading edge up.

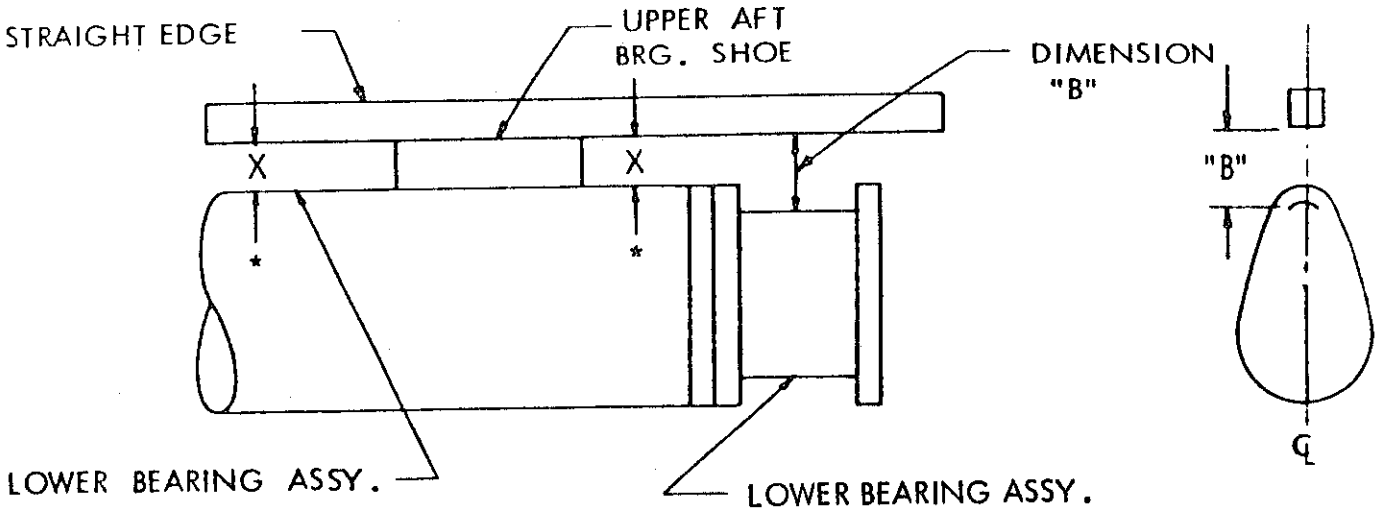
(b) Align and freeze the position of the lower bearing assembly when the centerline of the assembly coincides with the major chord of the faired mast.

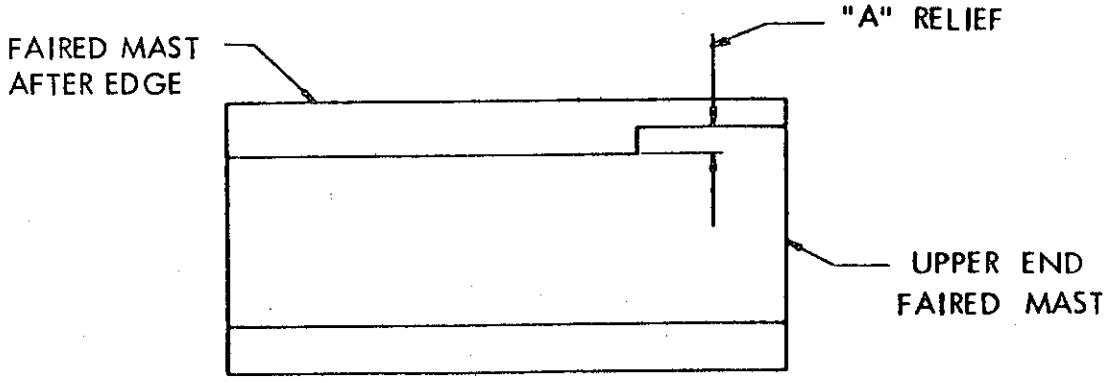
(c) Fit the forward two (2) shoes, Pc. 19, Ref. (9), and drill and countersink the center hole (screwhead to be 1/16 inch below the top surface of the shoe) and then secure the shoes to the sled with Pc. 13. Each shoe shall have 0.003 to 0.005 inch of clearance at the bearing surface interface after assembly and in the aligned position.

NOTE

(a) Template securing hole for forward shoes in accordance with Ref. (9).

(b) Use temporary shims behind each forward shoe, using them as "Go"/"No-Go" gauges in determining 0.003 to 0.005 inch clearance.





* Same dimension for parallelism

FIG 1-12

ILLUSTRATION FOR DETERMINING

AFT SLED BEARING SHOE THICKNESS

NOTE (Cont'd)

(c) Reposition the fitted lower bearing assembly at the lower and the upper end of the mast. Measure and record the clearance on each forward bearing shoe when the aft shoe contacts the inner surface of the faired mast.

Step 14. Install the gounding spring assembly, Pc. 27, and the scraper assembly, Pc. 38, on the lower bearing assembly, Ref. (9) in accordance with the following procedure:

Step 14. (Continued)

Installation Procedure on Tensioning Grounding Spring and Scraper Assembly

Manufacture a straddle plate and install and secure it with 6-32 threaded screws to the back side of the grounding spring and the scraper assembly. Tighten the screws until the center component that is surrounded by rubber is drawn (retracted) 0.090 inch toward the plate. Install and secure the compressed assembly contacting the internal grounding strip. Lockwire the screws. Remove and discard the straddle plate and the 6-32 threaded screws.

Step 15. Insert and pass the lower bearing assembly through the cavity of the faired mast to ensure proper bearing clearances and that the grounding springs and scrapers make proper contact with the internal grounding strips in the faired mast.

Step 16. Reinstall the lower bearing assembly on the radome. Torque Pc. 9, Ref. (9) to 20 foot-pounds and then lockwire the bolts.

b. Swivel Clamp Assembly, Ref. (11) Assy. #7 and Figure 1-13

Step 1. Install the support bar, Pc. 32, and the mounting bracket, Pc. 34, and secure them with elastic stopnuts, Pc. 31, and flatwashers, Pc. 32.

Step 2. Make up the clamp half, Pc. 38, to the cable and secure it to the swivel clamp body, Pc. 35 with Pcs. 36 and 37. Secure the clamp body to the bottom of the lower bearing assembly.

Step 3. Pressure test the radome with the attached cable in accordance with the testing procedure.

IV - FINAL SHOP ASSEMBLY

4-1 ASSEMBLY AND INSTALLATION

NOTE

All drilled holes, filed areas on the faired mast shall be epoxy sealed.

NOTE:

1. Sheaves and Support Brkt are fully assembled.
2. Use this view as a guide for assembly and disassembly.
3. Installation of the electrical cable requires removal of Pc 55.
4. A 1/4" clearance shall be maintained between Cable & Hubs, Pcs 68 & 77.
5. Thread coating, type VC-3 Nyloc, shall be applied to Screws, Pcs 110 & 114 when re-assembled.
6. For additional information see dwg 4491153.

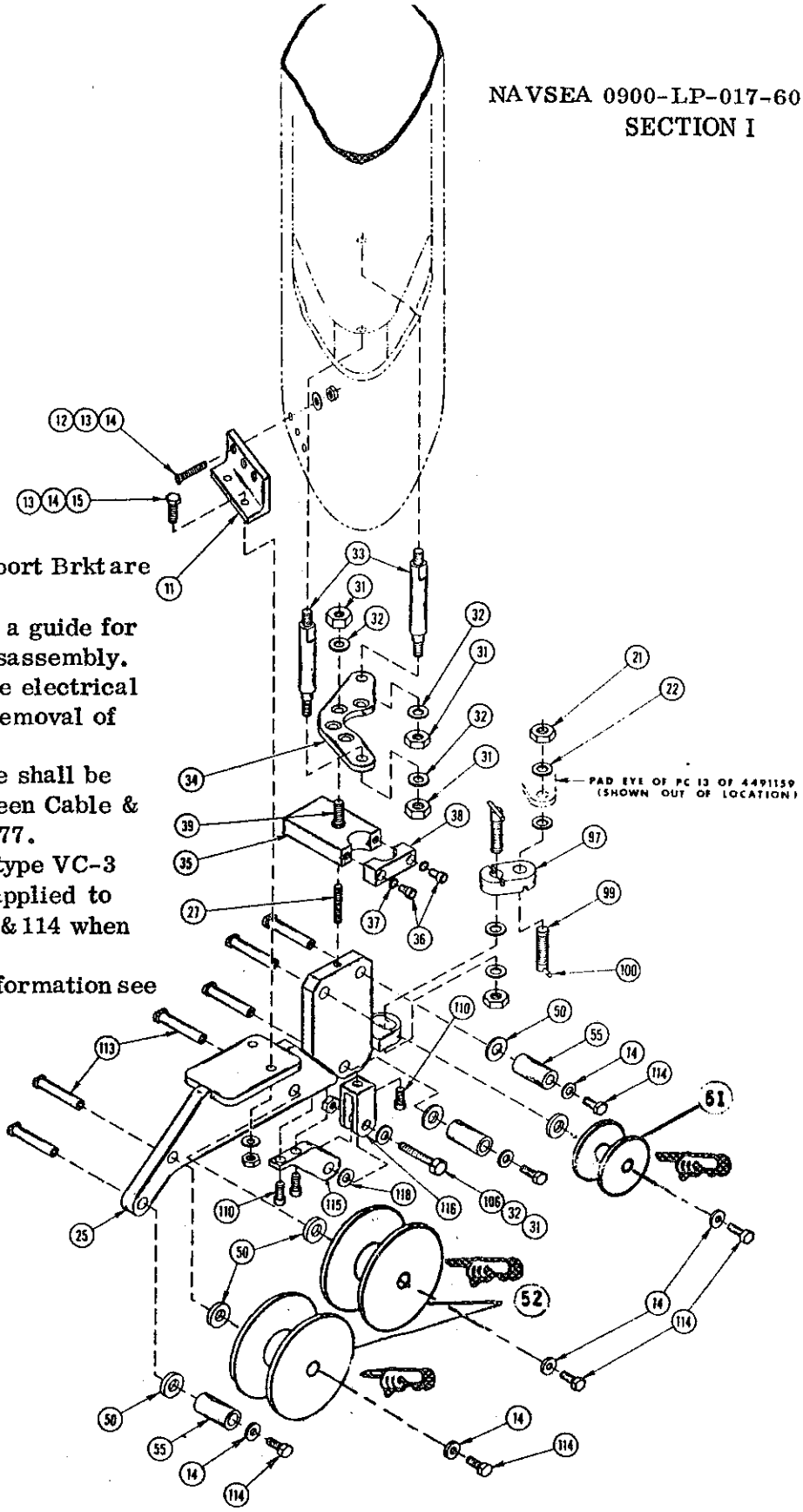


FIG 1-13
CABLE GUIDE SHEAVE & SUPPORT BRKT ASSY
REF DWG 4491153

Step 1. Determine whether the cable guide is to be installed on port or starboard.

Step 2. Scribe a line on the bottom of the faired mast 8-1/32 inches up from the trailing edge and perpendicular to the fore-aft centerline of the mast. (See Figure 1-14.)

Step 3. Align the center of the tie down bracket, Pc. 11 to the scribe line Step 2. The bottom of the tie down bracket Pc. 11 is to extend 1/2 inch below the bottom of the mast.

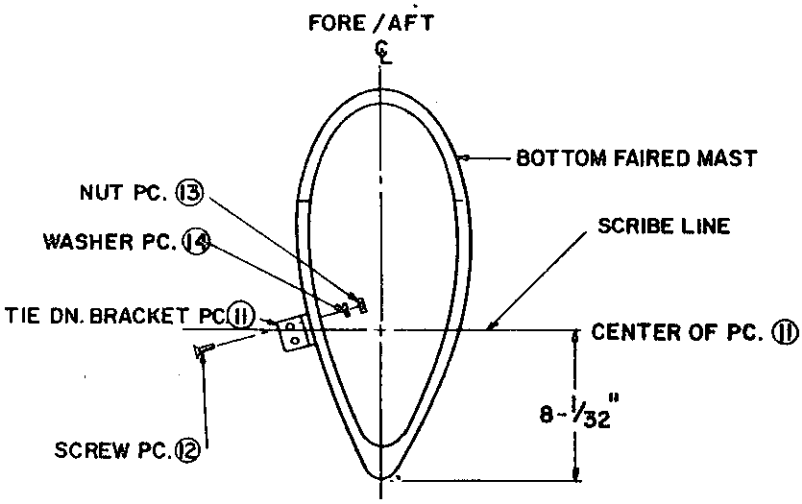


FIG. 1-14 MOUNTING THE TIE DOWN BRACKET

Step 4. Clamp the tie down bracket, Pc. 11 to the faired mast.

Step 5. Using the tie down bracket, Pc. 11 as a fixture, drill three (3) holes 13/32 inch diameter through the faired mast.

Step 6. Temporarily install Pcs. 12, 13 and 14 on the tie down bracket, Pc. 11 and remove the clamp.

Step 7. Secure Pcs. 21 and 22 to the mounting lug, Pc. 17 of the sheave support arm, Pc. 25.

Step 8. Align the mounting pad, Pc. 26 (attached to the support arm, Pc. 25) so that it is in the center of the tie down bracket, Pc. 11 and clamp the pieces together.

Step 9. Using the tie down bracket, Pc. 11 as a guide, scribe the hole locations onto the mounting pad, Pc. 26 and drill two (2) 13/32 inch holes.

Step 10. Remove the support arm, Pc. 25 and the tie down bracket, Pc. 11.

Step 11. Assemble all the components as shown on Figure 1-13.

Step 12. Reinstall the support arm, Pc. 25 to the pad eye, Pc. 13 of Ref. (7) only. Other components are to be installed at installation.

a. Installation of the Faired Mast Closure Cap. Piece and detail numbers that appear in this procedure are shown in Ref. (15)

Step 1. Check that the mast cap, Pc. 48, meets the drawing configuration requirements. Dress up as required to meet this configuration.

Step 2. Establish and lay out the fore and aft datum lines on top of the faired mast cap.

Step 3. Establish and lay out an athwartship datum line on top of the faired mast cap perpendicular to the fore/aft line and 4-15/16 inches aft of the forward end of the cavity (measured from the established fore/aft datum line).

Step 4. Lay the bottom side (faired mast interface side) of the closure cap on a flat surface and establish four (4) vertical lines onto the sides of the mast cap representing the fore/aft and athwartship datum lines. Using a square, pick up and transfer the top surface datum lines to the sides.

Step 5. Establish and lay out the vertical datum lines on the upper end of the leading and trailing surface of the faired mast coinciding with the major chord plane of the mast.

Step 6. Establish and lay out the two (2) vertical datum lines on the side of the upper end of the faired mast. The datum lines shall be 14-15/16 inches aft of the forward surface of the faired mast and parallel to it.

Step 7. Form-fit the support, Pc. 6, to a depth of 3 inches in the inner contour of the faired mast (Detail A-19). Machine off the interference points on the support until a form fit is attained.

Step 8. On the outer surface of the support, establish a vertical centerline. Drill and tap one hole on this centerline 1-1/2 inches from the bottom for a Keensert, Pc. 7. Install the Keensert as follows:

a. Tap drill with 0.516-inch-size drill

b. Counterbore 82^{o} to 100^{o} by 0.572 inch diameter

c. Tap with a 9/16-12 UN-2B tap

d. Install insert 0.010 to 0.030 inch below the surface

e. Drive the locking keys down

Step 9. On the upper forward side of the faired mast surface, drill and counterbore one hole as per details A-6 and B-8.

Step 10. Secure the support, Pc. 6, to the faired mast with one (1) screw, Pc. 8. Clamp the ends of the support to the faired mast. Layout, drill, and counterbore and tap the support to the faired mast (detail A-19 and B-8) for the remaining four (4) screws, Pc. 8. Remove the support from the faired mast and install the four (4) Keenserts and then secure the support to the faired mast with the screws, Pc. 8.

Step 11. Place the faired mast horizontally in chocks with its forward edge (leading edge) up.

Step 12. Install and rest the closure cap bottom on the faired mast and on the projection of the support, Pc. 6. Form-fit the interior of the closure cap to the support until the datum lines (fore-aft-port and starboard) on the closure cap coincide with the datum lines on the faired mast. Machine the closure cap at points of interference and build up the void areas with epoxy where required to ensure the support, Pc. 6, totally contacts the interior of the closure cap when in the aligned position.

Step 13. After fit and alignment is attained, layout, drill, counterbore and tap the closure cap and the support as required (details A-18 and B-8). Install a Keensert, Pc. 7, in the support, Pc. 6.

Step 14. Layout, drill and counterbore the aft end of the cap, Pc. 48, for the screw, Pc. 26 and washer, Pc. 27 as per detail A-20.

Step 15. Layout, drill and tap upper aft end of the faired mast as per detail D-10. Alignment of the closure cap to the faired mast must be maintained. Coat the threaded hole and plug, Pc. 25, with epoxy and then install the plug into the threaded hole.

Step 16. Apply bonding epoxy (Ref. (15) Note 11) to the outer surface of the support, Pc. 6 (closure cap side only) and the mating surface of the closure cap and then secure the support to the closure cap with screws, Pc. 8. Install a screw, Pc. 26 and a washer, Pc. 27, in the after end of the closure cap. Let bonding and epoxy cure for eight (8) hours.

NOTE

Exercise care that the epoxy does not bond the closure cap to the mast.

Step 17. Contour the side surfaces of the closure cap to the faired mast surfaces. Where required, build-up the depressed areas with epoxy. Exercise care that the epoxy build-up area does not bond the closure cap to the faired mast. The closure cap must be removable by unbolting. Fill the four (4) counterbored holes for screws, Pc. 8, in the closure cap with epoxy and then blend in the fill.

NOTE

The screws in the faired mast will be used for unbolting the closure cap.

Step 18. Unbolt and remove the closure cap assembly.

b. Antenna Radome Upper Aft Bearing Assembly (Assy. 2), Ref. (3) Figure 1-4

Step 1. Position the top of the aft upper bearing shoe, Pc. 65, 1/4 inch below the top of the channel in the faired mast.

Step 2. Assemble the port side bearing shoe retainers, Pc. 57, on the upper end and Pc. 61 on the lower end with the connecting rod, Pc. 52, and hardware, Pcs. 46 and 47.

Step 3. Assemble the starboard side bearing shoe retainers, Pc. 61, on the upper end and Pc. 57 on the lower end with the connecting rod, Pc. 52, and hardware, Pcs. 46 and 47.

Step 4. Contain the aft bearing shoe in the faired mast by positioning the retainers and adjusting the connecting rod to obtain a contact fit between the retainers and the shoe.

Step 5. Clamp the retainers to the faired mast to indicate their positions. Then scribe circles on the faired mast through the tapped retainer holes. The holes will be concentric with the scribed circles.

c. Antenna Radome Upper Forward Bearing Assembly, Ref. (3)

Step 1. With the antenna radome resting on the aft upper mast bearing shoe, Pc. 65, place the two (2) forward bearing shoes, Pcs. 31 and 32, in their respective bearing cavities of Pc. 7. Form-fit the shoes to the contour of the radome by hand-sanding.

NOTE

The bearing shoes shall have a minimum of 50% bearing contact, uniformly distributed and have a surface finish no rougher than RHR 63.

Step 2. With the antenna radome resting on the aft bearing shoe, machine off the back side of each forward bearing shoe, Pcs. 31 and 32 that when assembled with the spacer, Pc. 16, will give 0.003 to 0.005 inch clearance at bearing shoe/radome interface.

Step 3. Machine the retainer tab recesses in the top of each forward bearing shoe, Pcs. 31 and 32.

Step 4. Assemble the forward upper bearing assembly, comprising Pcs. 9, 11, 13, 16, 31, and 32.

d. Adjustable Erecting Sheave Assembly (Ref. 4)

Step 1. Install the adjustable erecting sheave hinge, Pc. 27, to the bracket, Pc. 4 with the hinge arm, Pc. 34, and pins, Pc. 30, washers, Pc. 31. Lock all components with cotter pins, Pc. 32.

Step 2. Place the adjustable erecting sheave assembly in the upper end of the faired mast. Secure the hinge leaf, Pc. 27, to the faired mast with hex head screws, Pc. 8, Ref. (3). The head of Pc. 8 shall be drilled 1/16 inch diameter and lockwired 0.051 inch Monel wire.

e. Assembly of the Hydraulic Hoist Cylinder Assembly into the Faired Mast

NOTE

Upon receiving a completely assembled and tested hydraulic hoist cylinder, Ref. (13), with the cable anchor tube assembly, Pc. 56, Ref. (1) assembled on the upper bushing of the cylinder, the following procedure shall be followed.

f. Hoist Cylinder Assembly

NOTE

Clean all external parts of the hydraulic cylinder prior to disassembly.

Step 1. Place the cylinder horizontally on a work table in a clean environment.

Step 2. Remove the protective cover plate or cylinder base from the bottom of the cylinder.

Step 3. Remove the collar, Pc. 105 from the piston rod, Pc. 102.

Step 4. Remove the upper gland, Pc. 110 from the cylinder.

Step 5. Place a plastic collar on the upper end of the piston rod. (To keep the piston rod in the center of the cylinder bore).

NOTE

Place the tape on the upper end of the piston rod before installing the collar. The collar must be tight on the rod.

Step 6. Push the piston down through the cylinder until the piston protrudes two (2) inches beyond the cylinder's lower end.

Step 7. Place a nylon strap around the piston, Pc. 73 and attach the other end to a chain hoist.

Step 8. Continue removing the piston rod, Pc. 102 with the piston, Pc. 73.

Step 9. When the rod is out sufficiently, place another strap around the piston rod, Pc. 102.

NOTE

Lift the piston rod, Pc. 102, keeping it centered while removing it from the cylinder.

Step 10. Place the piston rod on covered wooden chocks.

Step 11. Remove the dash pot, Pc. 89 from the cylinder base, Pc. 53 by removing nut, Pc. 90.

Step 12. Remove spring, Pc. 85 and retainer, Pc. 86 and ball, Pc. 83 from dash pot, Pc. 89.

Step 13. Remove caution plate, Pc. 62, vent plug, Pc. 48 and the needle valve, Pc. 41 from the cylinder base.

Step 14. Remove the set screw, Pc. 103 that locks the piston, Pc. 73 to the piston rod, Pc. 102.

Step 15. Unscrew the piston from the piston rod with the clean strap wrenches.

Step 16. Remove the sleeve, Pc. 95 from the piston, Pc. 73.

Step 17. Remove all springs, balls, valve seats as shown in Figure 1-15 from the piston, Pc. 73.

Step 18. Remove all the "O" rings, back-up rings and the wiper strip from the cylinder base, Pc. 53, piston, Pc. 73 and gland, Pc. 110 and dispose of all the pieces.

Step 19. Blow air through all the pipes and clean all the components with trichlorethelen solvent (or equivalent).

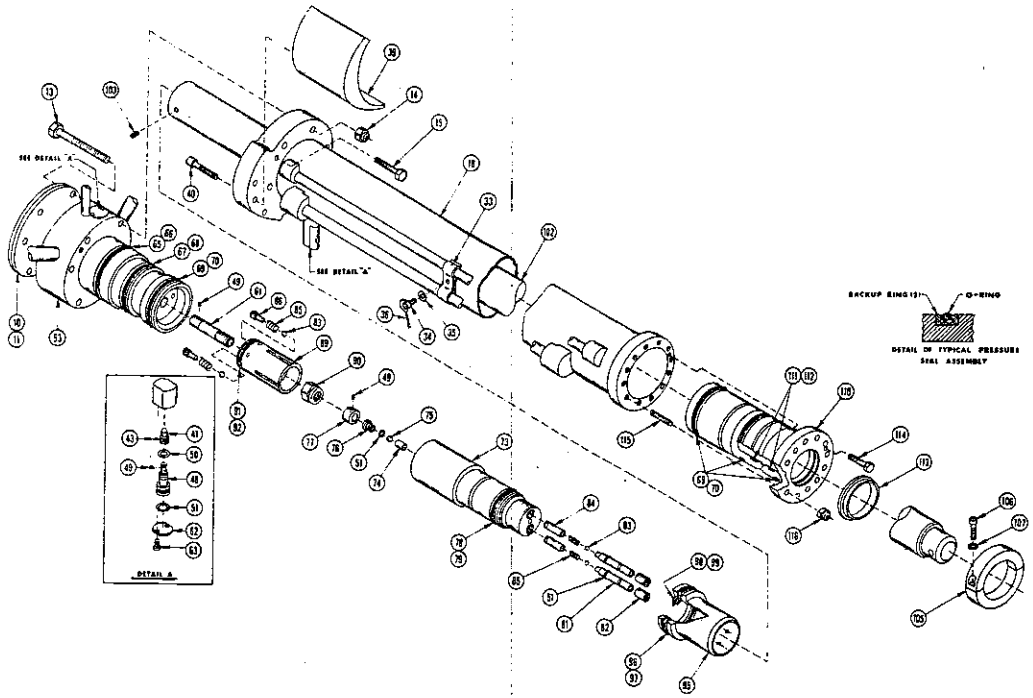
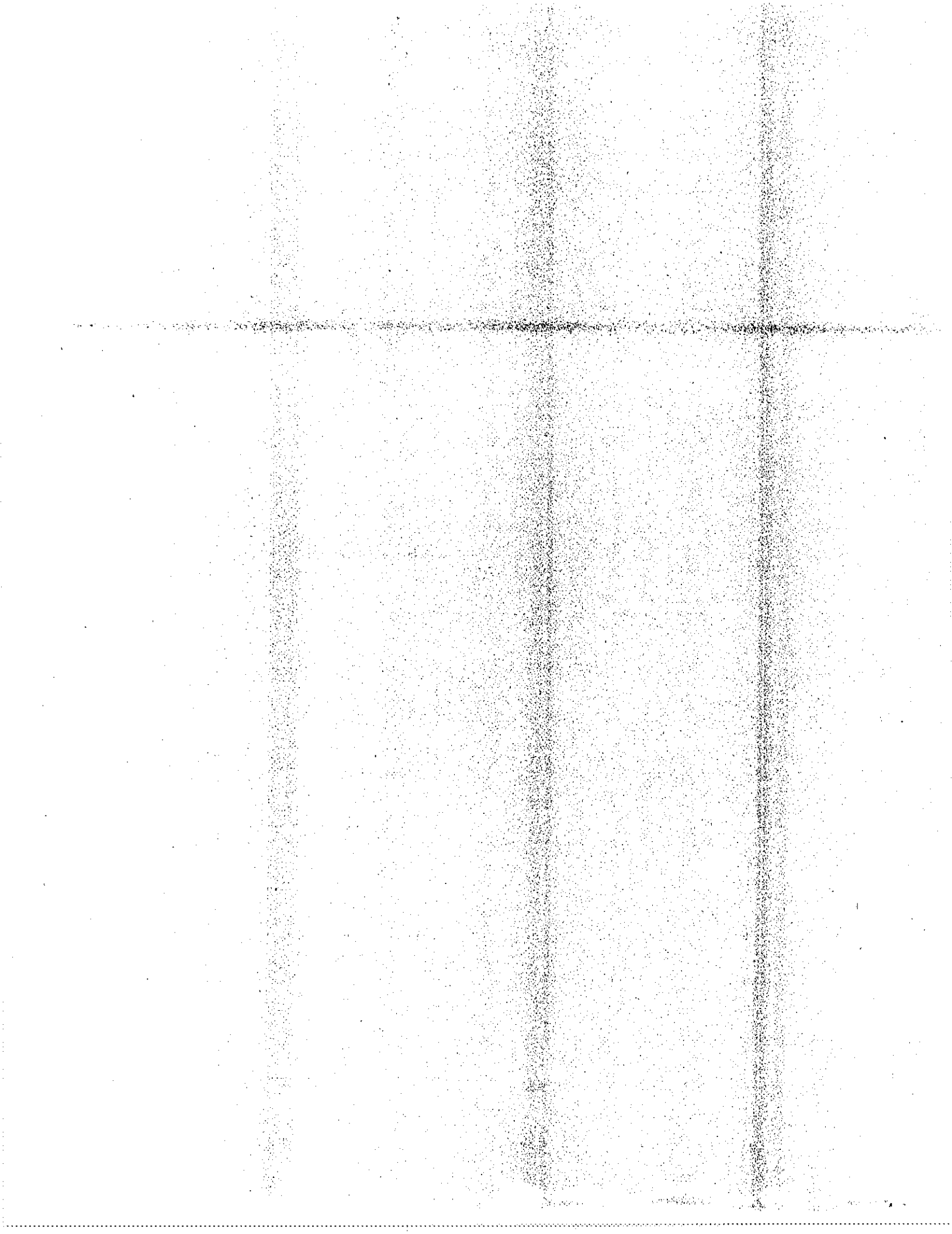


FIG 1-15

HYDRAULIC CYLINDER ASSEMBLY



Step 20. Measure and inspect the following:

(a) Piston Rod, Pc. 102

1. The piston rod shall be straight within 0.015 inch over the entire length with local variations not to exceed 0.002 inch per foot. Variation due to its own weight are not to be included in the 0.015 straightness.

2. The O.D. of the piston rod shall have a 16 microinch finish or better, and be free of scratches.

3. The piston rod diameter shall be 2.875 inches (nom).

4. Inspect all vent and ball seats.

(b) Cylinder, Pc. 17

1. The cylinder's I.D. shall not vary more than 0.002 inch throughout its entire length.

2. The I.D. shall be straight within 0.030 inch in its full length with local variations not to exceed 0.005 inch per foot. The variation is due to its own weight, and is not included in the 0.030 inch straightness.

3. The finished bore shall be 16 microinch finish except for the "O" ring areas which are 32 microinch finished or better.

4. The I.D. is 3-1/2 inches (nom).

g. Clearance and Surface Finish Requirements

(1) Gland, Pc. 110

(a) Upper gland, I.D. shall have a 0.004 inch to 0.006 inch diametrical clearance with the mating piston rod.

(b) The I.D. of the gland to provide 0.001 inch to 0.002 inch diametrical clearance with mating sleeve, Pc. 45.

(c) Finish of the mating surfaces shall have a 32 microinch finish.

(2) Piston, Pc. 73

(a) The O.D. of the piston shall have a 0.005 inch to 0.009 inch diametrical clearance with the mating cylinder.

(b) Finish of the mating surfaces shall have a 32 microinch finish.

(c) The I.D. of the piston will be 2.750 inches to 2.752 inches with a finish of 32 microinches.

(3) Sleeve, Pc. 95

(a) The O.D. of the sleeve shall have a 0.003 inch to 0.004 inch diametrical clearance with the mating gland, Pc. 10.

(b) The finish of the mating surfaces shall have a 32 microinch finish or better.

(4) "O" Ring Grooves

(a) All grooves shall have a 32 microinch finish or better.

(b) The depth and width dimensions shall be machined to Ref. (a) or Ref. (b).

(c) All edges/corners shall have a 0.005 inch to 0.010 inch radius.

(5) "O" Rings and Back-Up Rings

(a) All new "O" rings and back-up rings shall be used.

(b) All "O" rings and back-up rings are to be coated with the system hydraulic oil prior to installation.

(c) All "O" rings and back-up rings shall be visually inspected for imperfections prior to installation.

h. Installation of Hydraulic Cylinder Components

NOTE

Pc. 113, wiper strip to be as manufactured by E.F. Houghton Co., Philadelphia, Pa. or equal as shown on page 98 of handbook, 8th Edition (Part no. 10V70-VIX-SYN).

Step 1. Use Figure 1-15 and install in the reverse order of removal except for the following:

(a) Molykote shall not be applied to any area that may possibly be exposed to hydraulic oil.

(b) Anaerobic sealant, MIL-S-22473C, is similar to Locktite Sealant, Grade "A" and is manufactured by the Locktite Corporation and shall be applied to clean the tapped holes.

CAUTION

Place this sealant on threads only.

(c) When the piston is threaded and tight on the piston rod, the piston shall be spot-drilled to the depth of the thread pitch. The cone set screw is then inserted and staked. The spring retainer, Pc. 86 shall also be staked at assembly.

i. Cleanliness Requirement

(1) Oil samples shall be taken of the completed hydraulic cylinder assembly and shall meet the following requirements:

(a)

Particle Size Range (Microns)	No. of Particles (Per 100 M.)
25-100	7500
100-500*	100
over 500*	8

* No particles over 250 microns except fibers are permitted. Fibers are defined as particles larger than 100 microns with a ratio of a length to width greater than ten to one (10:1).

(b) After accomplishment of acceptable cleanliness level, blank off all base nipple ports to assure exclusion of contaminates during storage/shipment.

j. Test

Step 1. Install the cylinder base on the cylinder and blank off the top of the cylinder, base nipples ports. Apply a 4500 psi internal hydrostatic pressure test for one hour; no leakage is permitted.

Step 2. Test the assembled cylinder as follows:

(a) With 4500 psig pressure on cylinder C-3 (leak off) line and ports C-1 and C-2 open to atmosphere for ten minutes. No leakage is allowed.

(b) With the needle valve assembly, Pc. 41 removed, install the vent plug assembly, Pc. 47 to port C-2 (supply-to-lower). With port C-1 (supply-to-raise) open apply 4500 psig to port C-2 (supply-to-lower). Hold for ten minutes. No leakage is permitted.

(c) Repeat Step 2(b) above, except remove the vent plug assembly 47 and install the needle valve assembly 41. Apply 4500 psig to port C-2 (supply-to-lower). Hold for one hour. No leakage permitted. Reinstall the vent plug assembly, 48 after the test.

(d) Remove the needle valve assembly 41 and install the vent plug assembly 47 to port C-1 (supply-to-raise). Apply 3000 psig to port C-1 (supply-to-raise), and port C-2 (supply-to-lower) and allow the piston rod to travel to the fully raised position. After the piston rod is in fully raised position, secure port C-2 (supply-to-lower) and hold 3000 psig for ten minutes. No leakage is permitted.

(e) Repeat Step (d) above except remove the vent plug assembly 47 and install the needle valve assembly 41. Apply 3000 psig to port C-1 (supply-to-raise) and port C-3 (supply-to-lower) and hold the pressure for one hour. No leakage is permitted. Reinstall the vent plug, assembly 47 after the test.

(f) With ports C-1 (supply-to-raise) and C-2 (supply-to-lower) open and the piston rod fully extended, apply 4500 psig to port C-3 (leak-off). Hold for ten minutes. No leakage is permitted.

(g) Reinstall caution plates item 62 over vent plug assembly 47.

(h) Upon completion of hydrostatic pressure test, take a sample of residual oil from the cylinder and document cleanliness level.

Step 3. When the problem is located in one of the below areas, refer to Figure 1-15 and the below outline:

(a) Gland Pc. 110. If leakage is present:

1. Disassemble and inspect the gland closely, ensuring that the O-ring grooves have a finish no greater than 32 microinches. If greater, rework to this requirement and install new wiper strip, Pc. 113 and pressure seal assemblies (Pcs. 14 through 17).

(b) Cylinder base weldment, Pc. 53. If leakage is present:

1. Inspect closely, ensuring that O-ring grooves have a finish no greater than 32 microinches. If greater, rework to this requirement and install new pressure seal assemblies, Pcs. 65 through 70).

(c) Hoist Cylinder. If unusual noise was detected inside of the cylinder, disassemble as follows:

1. Refer to Para. G.1, for disassembly of gland, Pc. 110. Then slide the plastic piston rod guide onto the upper end of the piston rod, Pc. 102.

2. Carefully remove the piston rod through the lower end of the cylinder. Inspect the entire length of the hoist cylinder, Pc. 17, inner surface and outside diameter of the piston rod, Pc. 102. Any scoring on the inside diameter of the hoist cylinder or outside diameter of the piston rod shall be reworked to the finish surfaces prescribed in Ref. (4).

3. O-ring grooves of piston, Pc. 73, and piston sleeve, Pc. 95, must have a surface finish no greater than 32 microinches. If greater, rework to this requirement and install new pressure seal assemblies. Pcs. 78 and 79 for the piston and Pcs. 96 through 99 for the sleeve.

k. Reassembly Test

(1) Gland, Pc. 110, cylinder, base, Pc. 53, and hoist cylinder, Pc. 17. Reassemble in reverse order. Ensure that all new O-rings are individually packaged in their original hermetically sealed envelopes: they shall be visually inspected for imperfections prior to assembly. Unpackaged O-rings shall not be used. See Para. 2.3 and 2.4 of Ref. (16) for guidance.

l. Records. Record all data of work performed in the ship's equipment history maintenance log for future reference.

m. Performance Checkout: Repeat checks as listed below to ensure trouble has been corrected.

(1) Gland and cylinder base. Wipe these areas dry, and apply hydraulic pressure to the hoist cylinder and check for leakage.

(2) Hoist cylinder. With hydraulic pressure applied, cycle the hoist cylinder and check for unusual interval noise, and possible leakage.

n. Installing the Hydraulic Hoist Cylinder Assembly into the Faired Mast

Step 1. Clean the wire rope cable terminal fittings and all associated threaded fasteners used to secure the cable terminal end fittings.

Step 2. Coat the hole in the end of the piston rod and the end of the piston rod with anti-seize lubricant; Molykote type "G" or "U" is specified. Orient the hole in the piston rod for proper mating to the piston rod mounting bracket.

Step 3. Install the hydraulic hoist cylinder assembly in the faired mast and insert the piston rod into the piston rod mounting bracket, Pc. 3, Ref. (5).

Step 4. Align the one-inch diameter holes in the piston rod and piston rod mounting bracket. Install the connecting pin, Pc. 12, Ref. (5), and secure with elastic stop nuts, Pc. 13.

Step 5. Reinstall the secure the hydraulic hoist cylinder steady bearing frame, Pc. 3 to the faired mast with Pc. 4, Ref. (6). Install Pcs. 7, 8, 12, 14 and 18, Ref. (6).

Step 6. Remove the cover plate and gasket, Pcs. 10 and 11 from the hoist cylinder bottom flange and install the cylinder base. Retract the piston rod into the hoist cylinder until the piston bottoms on top of the cylinder base. Install, fit and secure the

Step 6. (Continued)
column, Pc. 39, Ref. (13), with 0.010 to 0.020 inch clearance between the top of the column and the bottom of the faired mast with screws, Pc. 40. After the column is secured, remove the cylinder base and reinstall the cover plate.

Step 7. The support arm, Pc. 10, and the tie down bracket, Pc. 11, shall be installed after the antenna mast assembly is installed on the ship in accordance with installation drawings and Ref. (11).

o. Installing the Antenna Radome into the Faired Mast

Step 1. Position the faired mast horizontally in chock supports, with its leading edge up.

Step 2. Crane-lift the radome and enter its lower bearing assembly into the top of the faired mast approximately four (4) feet.

Step 3. Install and secure the antenna radome upper aft bearing assembly to the faired mast with screws, Pc. 45, Ref. (3).

Step 4. Slide the radome approximately 3/4 of its length into the faired mast.

Step 5. Install and secure the wire rope cable terminal fittings to the inner mast lower bearing assembly. See Figure 1-11. Each fitting is to be secured with two (2) 1/2-13 light series ESNA nuts. The lower bearing assembly shall separate the nuts.

Step 6. Position the inner mast lower bearing assembly with attached antenna; keep tension on the wire rope cables.

Step 7. Captivate the wire ropes in the grooves of the adjustable erecting and retracting sheaves.

Step 8. Remove the access covers at the piston rod pin. Place the cable end fitting, Pc. 53, Ref. (1) into the tie down fitting, Pc. 58, at the top of the hydraulic hoist cylinder.

NOTE

Loosen both the retracting and erecting adjustable sheave assemblies.

Step 9. Rotate the fitting lock screw, Pc. 60 to lock the cable end fitting, Pc. 53.

Step 10. Insert a lock screw 8-32-UNC-2A, Pc. 61, with VC 3 locking liquid, Pc. 28, applied to the threads, and lock the fitting with lock screw, Pc. 60.

Step 11. Tighten either nut, Pc. 15 or Pc. 21 on the adjustable sheave assembly until the bottom of the antenna lower bearing assembly is 33 inches from the bottom of the faired mast.

Step 12. Each cable to have 500 pounds tension. Use a tension meter model T5-8203-108 that has been calibrated for 3/8 inch dia. 7 x 19 corrosion resistance cable per MIL-C-5424.

NOTE

Maintain antenna distance, Step 11 when tensioning the wire rope cables.

Step 13. Place the retainer clips, Pc. 19, over the head of the screws, Pc. 15. Apply VC 3, Pc. 9, locking liquid on the threads of the screws, Pc. 6. Secure the clips with screws, Pc. 6 and washer, Pc. 7. Secure the retracting assembly in the same manner.

p. Installation of the Antenna Radome Closure Cap

Step 1. Determine the best position of the radome cap, Pc. 22, Ref. (15), onto the top of the antenna radome cover to assure attainment of a uniform 11/16 inch gap between radome closure cap and the faired mast closure cap.

Step 2. Bond the closure cap to the antenna radome cover using bonding material specified in Ref. (15), Note 11.

Step 3. Machine the sides and/or build up low areas on the sides of the radome closure cap and attain a uniform 11/16 inch gap between the radome and the faired mast closure cap.

Step 4. Blend in the bottom side of the radome closure cap (interface with the radome cover) to contour of the radome cover to assure smooth entry into the rubber seal.

NOTE

Rubber seals will be installed after caps are contoured to the sail top.

q. Bearing Frame Shop Assembly, Ref. (15), Figure 1-5

Step 1. Place two (2) bearing frame weldments, Pc. 13 and two (2) connecting plates, Pc. 25 on a table. (See Figure 1-14.)

Step 2. Place VC 3 thread coating, Pc. 27, on the flat head screws (5/8-11 UNC), Pc. 26. Mount the connecting plates, Pc. 25 to the bearing frame weldment, Pc. 13 with screws, Pc. 26.

Step 3. Measure the inside of the bearing frame from the forward to the after connecting plate, Pc. 25. The bearing frame is to be parallel and the overall inside dimension shall be 29.500 inches $\pm$0.005 inch.

r. Bearing Assembly. Forward Bearing Assembly. (Ref. (15) and Figure 1-16)

NOTE

The crown thickness of the forward bearing shall be 1.500 inches and the after bearing assembly shall be 1.438 inches with a faired mast largest fore-aft measurement of 26.562 inches. Final shim thickness shall be determined at installation to provide 0.005 inch clearance between the bearing face and mast at the faired mast largest fore-aft measurement.

Step 1. Place 0.160 inch thick (various sizes) plastic shims, Pc. 37 on the back side of the shoe bearings, Pcs. 31, 34 and 35. Trim side of shims and template hole locations from the shoe bearings.

Step 2. Assemble the shoe bearings, Pcs. 31, 34 and 35 and the shims, Pc. 37. Secure the backing plate Pc. 36 to the side bearing assembly with six (6) flat head screws, Pc. 33.

Step 3. Measure the overall length of the forward bearing assembly. Length shall be 12.75 inches, when overall length is too long, disassemble and machine the middle shoe bearing to achieve the required length.

s. After Bearing Assembly

Step 1. Place 0.10 inch thick plastic shims (various sizes), Pc. 37, on the back side of the shoe bearings, Pcs. 54, 55 and 56. Trim the side of the shims and template the hole locations from the three (3) bearing shoes.

Step 2. Measure the overall length of the after bearing assembly. The length should be 12.75 inches. If the required length is too long, machine the middle shoe bearing to achieve the required length.

Step 3. Assemble the shoe bearings, Pcs. 54, 55 and 56, and the shims, Pc. 37. Secure the backing plate, Pc. 57 to the side bearings with six (6) flat head screws, Pc. 33.

t. Side Bearing Assembly

NOTE

The crown thickness of each side bearing shall be 1.220 inches, plus the bearing container assembly thickness 1.710 inches. Total thickness of one complete bearing to be 2.930 inches. Final shim thickness shall be determined at installation to provide 0.005 inch clearance between the bearing face and the mast at mast minor material condition.

Step 1. Measure the overall length of the (3) side bearing shoes. The total length shall be 12.00 inches. If the required length is too long, machine the middle bearing only, to achieve the required length.

u. Contour Fit of Bearings, Figure 1-17. After Bearings.

Step 1. Place the forward edge of the faired mast in chock supports.

Step 2. Lightly Molykote a two foot section of the after bearing area, (trailing edge).

Step 3. Position the aft bearing shoe assembly, Pcs. 54, 55 and 56, on the faired mast after edge and slide the bearing back and forth across the two foot section.

Step 4. Remove the bearing shoe assembly and remove the high spots by scraping the black areas from the face of the bearing.

Step 5. Repeat Steps 2 and 3 until the black on the face of the bearing is equally distributed along 50% of the bearing face. Ensure that the crown of the bearing is contacting surface of the faired mast.

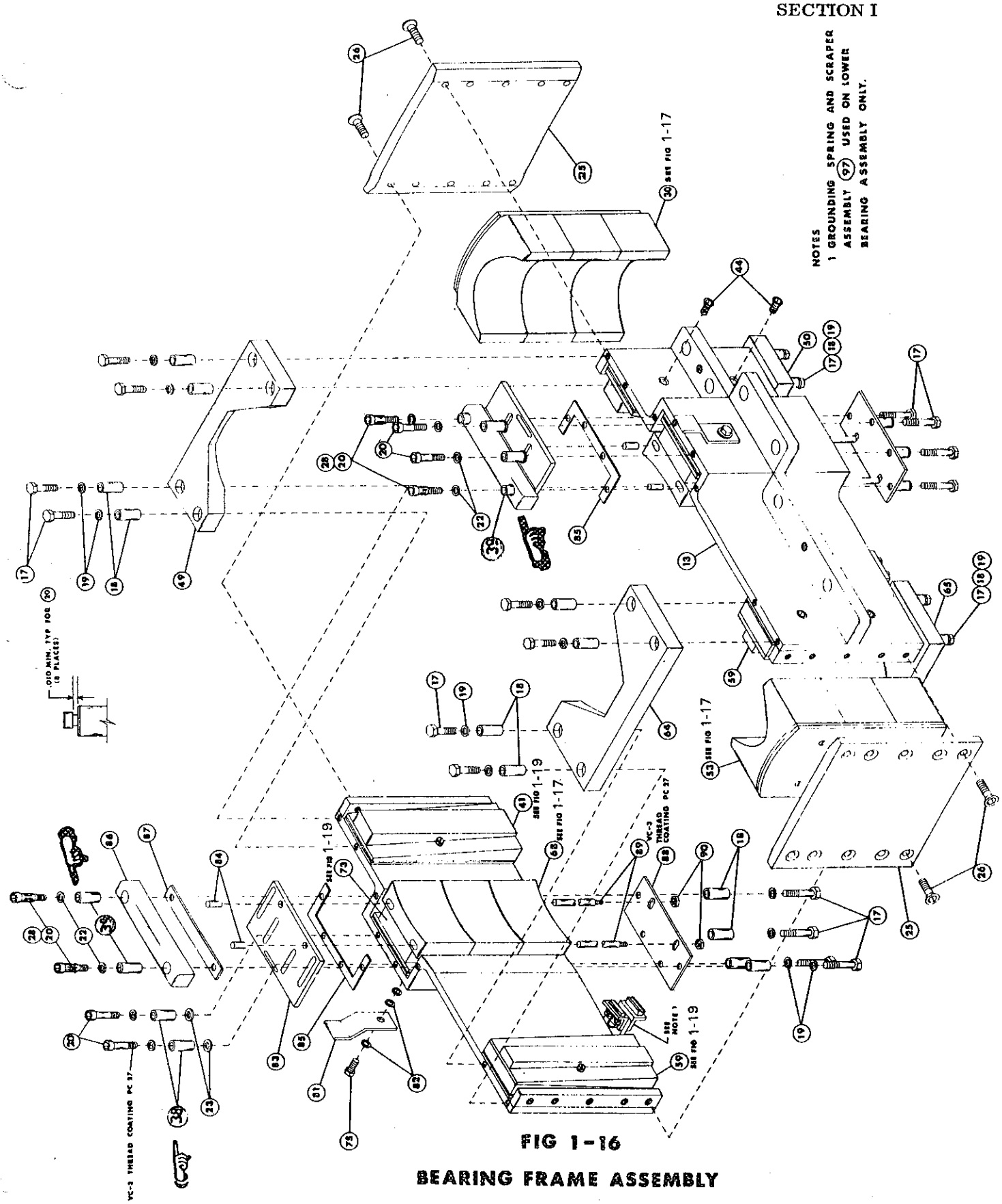


FIG 1-16

BEARING FRAME ASSEMBLY

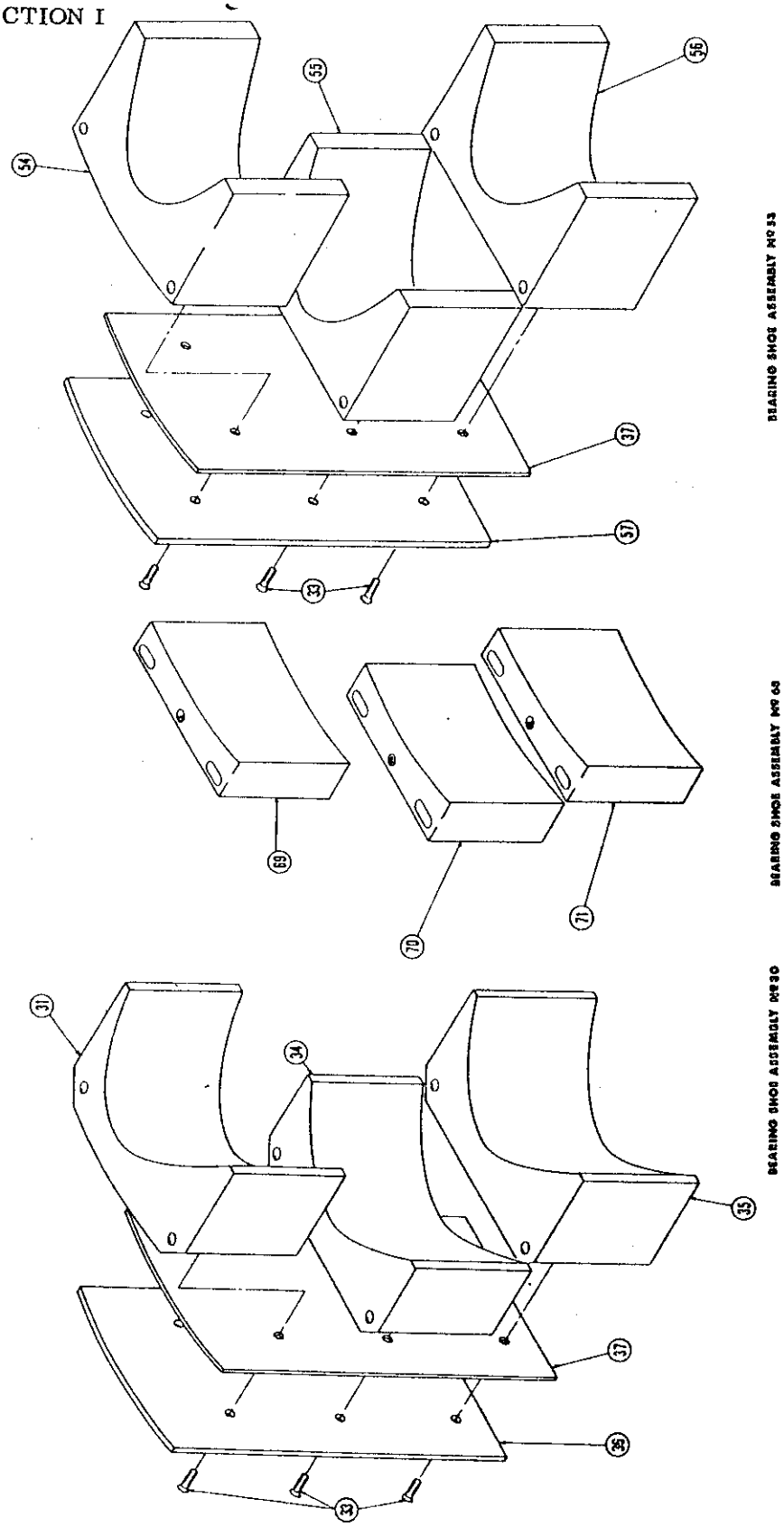


FIG 1-17
BEARING SHOE ASSEMBLY
REF DWG 491157

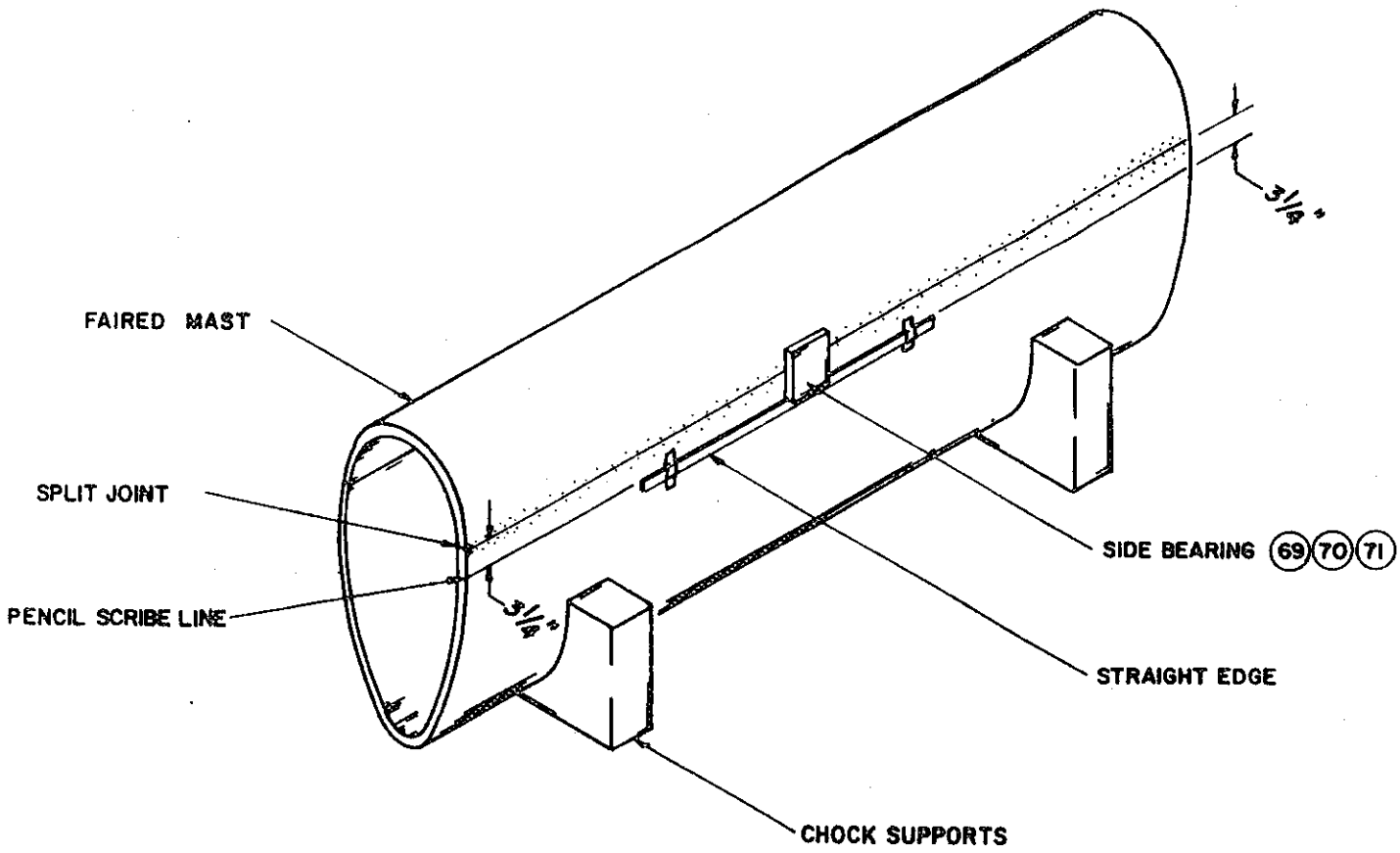


FIG 1-18
CONTOURING BEARINGS

Step 6. Sandpaper the scraped bearing surface until it is smooth.

NOTE

Use WET and DRY sandpaper that has been submerged in water.

Forward Bearings

Step 7. Turn the faired mast over and place the after edge (trailing) in chock supports.

Step 8. Repeat Steps 2 through 6 on the forward bearings.

Side Bearings

Step 1. Place a pencil mark 3-1/4 inches down from the parallel to the faired mast split joint. See Figure 1-18.

Step 2. Align the top edge of a three foot straight edge to the pencil line.

Step 3. Lay the side bearings, Pcs. 69, 70 and 71 on the straight edge (guide) and repeat Steps 2 through 6 on the forward bearings.

v. Container Assembly. Forward Container Assembly.

NOTE

(a) All container pieces are marked with assembly numbers and in accordance with Part 4 of Note 9, Ref. (15) and Figure 1-17. Also the P.V.C. bearing containers are marked bottom.

(b) The total thickness of the forward bearing container shall be 1.81 inches. Final shim thickness shall be determined at installation to provide the desired fore/aft alignment.

Step 1. Place 0.14 inch thick plastic shims (various thickness), Pc. 37, on the back side of the bearing container (P.V.C.), Pc. 74. Trim the sides of the shims and template the hole locations from the bearing container, Pc. 74.

NOTE

Template shim, Pc. 37 hole location from backing plate, Pc. 47 when predrilled.

Step 2. Insert the shims between the bearing container, Pc. 74 and backing plate, Pc. 77. Secure with screws, Pc. 33.

Step 3. Insert two (2) screws, Pc. 46 opposite side until the top of the screw protrudes 0.25 inch above the bearing container, Pc. 74.

Step 4. Align the taper wedge (rubber), Pc. 76, lengthwise and press rubber between the two (2) screws, Pc. 46 to contain the rubber wedge, Pc. 48.

NOTE

Natural color rubber (upper frame assembly 1). Black color rubber (lower frame assembly 2).

Step 5. Repeat the above steps to complete bearing unit assembly #1 upper and also for the bearing unit assembly #2 lower.

w. After Container Assembly

Step 1. Place the spacer, (P.V.C.), Pc. 63 on top of the bearing retainer, Pc. 60 and secure the two (2) pieces together with screws, Pc. 61.

Step 2. Place a 0.12 inch thick plastic shims, Pc. 37 on top of the spacer, Pc. 63. Trim the sides of the shims and template the hole locations from the spacer.

NOTE

Template shim, Pc. 37 hole location from the backing plate, Pc. 47 when pre-drilled.

Step 3. Secure the backing plate, Pc. 47, shims, Pc. 37 to the spacer with screws, Pc. 61.

Step 4. Insert the two (2) screws, Pc. 46 on the opposite side.

x. Assembly of Bearing Shoe and Container to Bearing Frame. Bearing Assembly, Ref. (15) and Figure 1-19.

NOTE

All bearing frame recesses adjusting screws and bearing shoe components shall be cleaned prior to their installation.

Step 1. Install the retainer plates, forward bottom, Pc. 50, side bottom, Pc. 88, and the after bottom, Pc. 65 on the bottom of the bearing frames, Pc. 13. Secure the retainers with spacers, Pc. 18, washers, Pc. 19, and coat threads of hex head screws, Pc. 17 with nylok VC 3, Pc. 27 before installing.

Step 2. Install one (1) aft bearing assembly, Pc. 53 and two (2) bearing containers, Pc. 59 on each side of the aft bearing assembly, Pc. 53. Secure the bearing containers to the bearing frame, Pc. 13 with four flat head screws.

Step 3. Install one (1) forward bearing assembly, Pc. 30 and two (2) bearing containers, Pc. 41 on each side of the forward bearing assembly, Pc. 30. Secure the bearing containers to the bearing frame, Pc. 13 with four (4) flat head screws, Pc. 44.

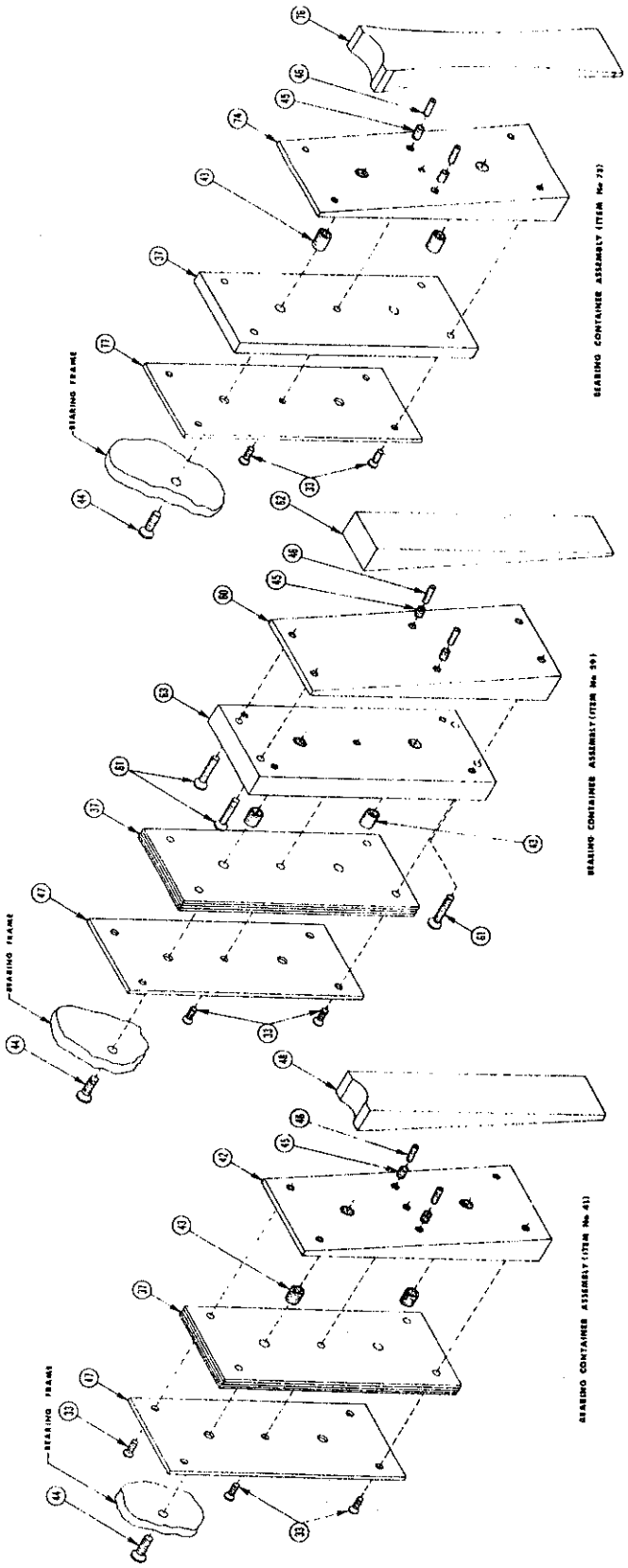


FIG 1-19
BEARING CONTAINER ASSEMBLY
REF DWG 4491157

Step 4. Install the side bearing containers, Pc. 73 to the bearing frame with flat head screws, Pc. 44 (bottom holes only).

Step 5. Install the four (4) dowels, Pc. 89 into the bottom retainers, and place VC 3 coating, Pc. 27 on the dowel threads and lock the dowels into the retainer with the hex nut, Pc. 90.

Step 6. Slide the side bearing assembly, Pc. 68 down and over the dowels, Pc. 69.

Step 7. Install the bottom retainer, Pc. 88 to the frame, Pc. 13 with spacers, Pc. 18, washer, Pc. 19, and apply VC 3 (thread coating, Pc. 27) to the hex head screws, Pc. 17 and install. Place the side top retainer bearing, Pc. 85 and the top retainer, Pc. 83 on top of the bearing frame, Pc. 13.

NOTE

Ensure that the small dowel pin, Pc. 84 is pressed in the top retainer and not protruding above the retainer.

Step 8. Assemble a shoulder screw, Pc. 20 with a washer, Pc. 22, spacer, Pc. 38, and washer, Pc. 23. Slide the tubing on the screw and cut off any excess that protrudes beyond the shoulder. Apply Locktite sealant, Pc. 27, (VC 3) on threads of shoulder screw, Pc. 20. Insert the screw, Pc. 20 through the top retainers, Pcs. 83 and 85. Tighten the screw, Pc. 20 until 0.010 inch exists between the top washer, Pc. 22 and the under side of the head of the screw, Pc. 20.

Step 9. Place the retainer support bearing, Pc. 87 and the retainer support, Pc. 86 on top of the top retainer, Pc. 83.

Step 10. Assemble a shoulder screw, Pc. 20 with a spacer, Pc. 39 washer, Pc. 22. Slide the tubing, Pc. 28 on the screw and cut off any excess that protrudes beyond the shoulder. Apply Locktite sealant, Pc. 27 (VC 3) on the threads of the shoulder screws, Pc. 20. Insert the screw, Pc. 20 through the top retainer, Pc. 83, retainer support, Pc. 86, retainer support bearing, Pc. 87 and thread the screws into the bearing frames. Tighten the screw, Pc. 20 until 0.010 inch exists between the top washer, Pc. 22, and the under side of the screws head, Pc. 20.

Step 11. Slide the end of the leaf spring, Pc. 81 into an elongated slot in the top retainer, Pc. 83. Secure the leaf spring, Pc. 81 to the bearing frames with a washer, Pc. 82 and a 1/2 inch hex headed screw.

NOTE

(a) The final thickness of all the bearing shims shall be determined at installation to provide 0.005 inch clearance between the bearing face and the mast for side bearings and 0.005 inch clearance at maximum material condition of mast for the forward and after bearings.

(b) When a faired mast is repainted by an activity other than NAVSECPHILADIV, the antenna/mast assembly shall be inspected and dimensional and straightness measurements shall be taken and recorded. The fore/aft and athwartships measurements shall be inscribed on the name plate on the bottom of the faired mast.

(c) Bearing shoes shall be recontoured to the antenna/mast assembly when repainted.

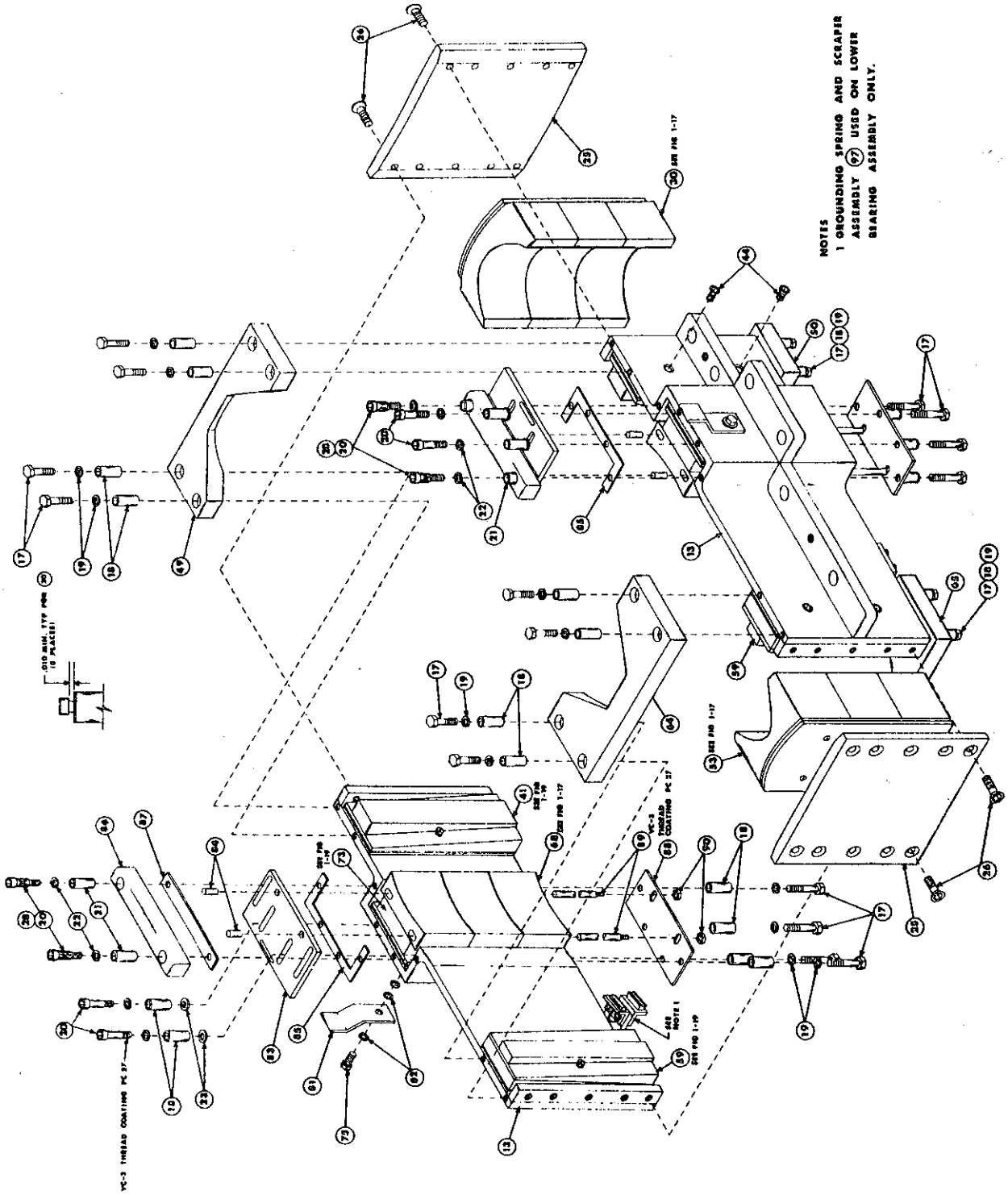


FIG 1-20
MAIN MAST BEARING FRAME ASSEMBLY
REF DWG 449157

PROCEDURE

FOR

SHIPBOARD INSTALLATION

OF THE

TRIDENT OE-207A(V)/BR ANTENNA AND MAST ASSEMBLY

CYLINDER BASE AND BEARING FRAMES

DEPARTMENT OF THE NAVY
NAVAL SHIP SYSTEMS ENGINEERING STATION
PHILADELPHIA DIVISION

PROCEDURE

FOR

SHIPBOARD INSTALLATION

OF THE

TRIDENT OE-207A(V)/BR ANTENNA AND MAST ASSEMBLY

DEPARTMENT OF THE NAVY
NAVAL SHIP SYSTEMS ENGINEERING STATION

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1 - GENERAL INFORMATION

1-1 INTRODUCTION

a. Purpose. The purpose of this procedure is to provide instructions for the installation and alignment of a hoist cylinder base and mid-mounted bearing frames that were manufactured to references c and e.

b. Scope. This procedure describes in a step-by-step method, the use of optical tooling and fixtures for installation and mechanical alignment of a hoist cylinder base and mid-mounted bearing frames.

c. Applicability. This procedure is applicable for all non-penetrating antenna masts incorporating flange mounted bearing frames manufactured to reference c.

d. Special Instructions. The degree of precision required for application of optical alignment techniques dictates that all optical tooling operations be handled and performed by experienced personnel who are properly trained in the use of optical alignment equipment.

CAUTION

All mating surfaces between optical equipment and optical fixtures and/or shipboard components shall be clean and free of burrs.

(1) Before applying this procedure, read through it in its entirety and study all illustrations to become acquainted with techniques and terms as used herein.

(2) Because the ship's fairwater may be distorted by uneven heating during the day, all measurements required by this procedure shall be taken between 2300 and 0800 hours.

e. General Instructions. All personnel assigned to perform the actual alignment check described in this procedure must know the basic principles of an alignment telescope and how it is used in the auto reflection, auto collimation and telescope modes. Great care must be exercised to position movable targets and telescope holders to the same fiducial mark (standard of reference) on all subsequent rechecks.

(1) The alignment telescope optical system provides a line of sight that is absolutely straight and from which measurements can be made with great accuracy.

(2) Two optical micrometers are built into the alignment telescope. These move the line of sight parallel to itself, left and right and up and down. The motions are controlled by micrometer knobs that show the extent of movement in thousandths of an inch.

(3) It is particularly important when using a telescope in optical tooling to eliminate any parallax that might result from faulty focusing of either the eyepiece or the objective. The objective lens of a telescope should form a small inverted image on the plane of the cross lines. The eyepiece is a microscope that magnifies this image along with the cross lines. It usually erects the image as well. It is essential that the image be exactly focused on the plane of the cross lines. If it is not, when the eye is moved slightly up and down or left and right, the cross lines will apparently move over the image and thus destroy the accuracy of the sight. This condition indicates parallax between the cross lines and the image. The eyepiece is first adjusted according to the natural focus of the eye of the observer until the cross lines appear sharp and clear. While making this adjustment, the observer should hold a white card in front of the telescope, slanted so that it throws light into the lens. The instrument is then aimed at the object to be sighted, and then the main focus is regulated until parallax is eliminated. Turning the focusing knob actually moves the image back and forth in the telescope. If, when the parallax is eliminated, the image is not clear, the observer has changed the focus of his eye. The eyepiece should then be slightly refocused.

(4) Use a camel hair brush to remove loose dust from the alignment telescope lens. When further cleaning is required, wipe the lens gently with a soft clean cotton cloth and then finish cleaning with a lens tissue.

(5) Secure a spherical adapter on the barrel of the alignment telescope when the alignment telescope is mounted vertically. The adapter precludes introducing a strain in the alignment telescope. To prevent damaging the optical system, do not overtighten the collet when securing the spherical adapter to the alignment telescope barrel.

(6) When using the "C" clamps to temporarily hold optical fixtures, exercise care not to overtighten them so as not to distort the optical fixtures. A distorted optical fixture can introduce error into the alignment effort.

(7) In order to realize meaningful readings during the process of optical alignment, exercise extreme care to ensure positioning the alignment telescope and targets toward the same reference mark.

(8) When not in use, the alignment telescope shall not be exposed to the sun's rays. This will prevent unequal expansion of components.

(9) The alignment telescope should be operated unhurriedly, allowing enough time to make accurate observations. Working against time invites inaccuracies and mental fatigue.

(10) To minimize error due to backlash in the movement mechanisms, the last movement of the fine adjusting screws, scale displacing screws, micrometer screws and focusing adjustments must always be made in the same direction.

(11) All readings shall be taken with the operator's hands off the optical instrument and its supporting pedestal to eliminate errors caused by accidental deflection of the instrument through body contact or body heat.

(12) Optical fixtures shall be checked to their design specifications against the applicable manufacturing drawings before and after use to confirm that meaningful readings were obtained.

1-2 REFERENCES

a. NAVSEA Dwg SS-522-2477226, Antenna Alignment Fixture - Universal

b. NAVSEA Dwg SS-125-2477220, Flushing Block and Protective Cover

c. NAVSEA Dwg SS-426-4491157, Bearing Assy and Details

d. Optical Alignment Manual K and E No. 711000

e. NAVSEA Dwg SS-585-4398602 Hydraulic Cylinder Assy & Det (Assy 2)

NOTE

All plan piece part numbers referred to in this procedure shall be in accordance with reference a, unless otherwise indicated.

1-3 SPECIAL TOOLS AND EQUIPMENT REQUIRED

a. One Keuffel and Esser Alignment Telescope #712022 (or equivalent).

b. Two Keuffel and Esser Mirror Targets #716250 (or equivalent).

1-3 SPECIAL TOOLS AND EQUIPMENT REQUIRED (Continued)

c. One Keuffel and Esser Spherical Adapter (with collet) #715100.

d. One Keuffel and Esser Spanner Wrench, #715102.

e. One Keuffel and Esser Open Target, #716170.

f. Components per NAVSEA Dwg SS-522-2477226.

g. Four 2-inch Light Duty "C" Clamps.

h. Lifting Clamps of applicable Faired Mast Assembly.

i. Alignment fixture support assembly per Figure 4.

j. Jacking Clips per Figure 15.

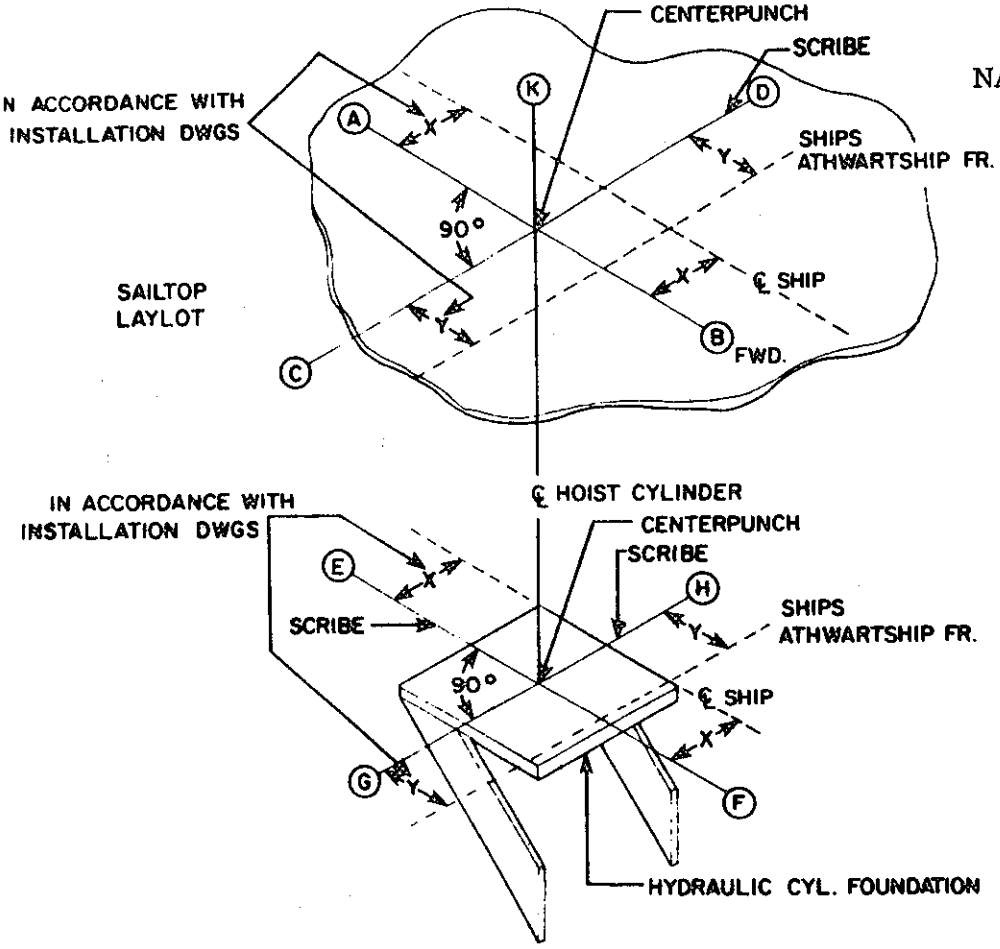


Figure 2-1. Hydraulic Cylinder Foundation and Sail Top Reference Lines

A-B LAYOUT AND ESTABLISH THE FORE/AFT LINE FROM INSTALLATION DRAWINGS

C-D LAYOUT AND ESTABLISH THE ATHWARTSHIP LINE FROM INSTALLATION DRAWINGS

E-F LAYOUT AND ESTABLISH THE FORE/AFT LINE FROM INSTALLATION DRAWINGS

G-H LAYOUT AND ESTABLISH THE ATHWARTSHIP LINE FROM INSTALLATION DRAWINGS

INTERSECTION OF ESTABLISHED REFERENCE LINES DENOTES HOIST CYLINDER CENTERLINE

CENTER PUNCH THE INTERSECTION OF THE TWO LINES FOR DISTINCTNESS

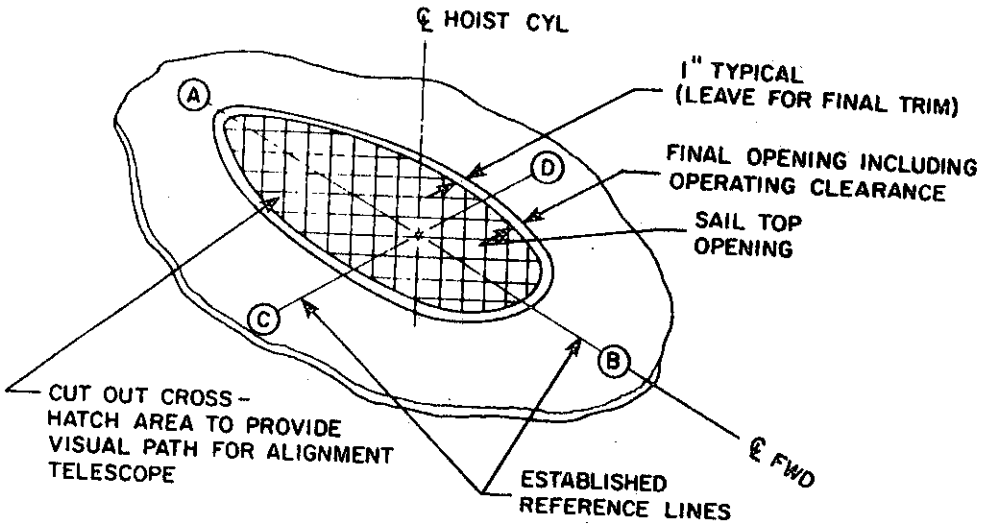


Figure 2-2. Opening in the Sail Top

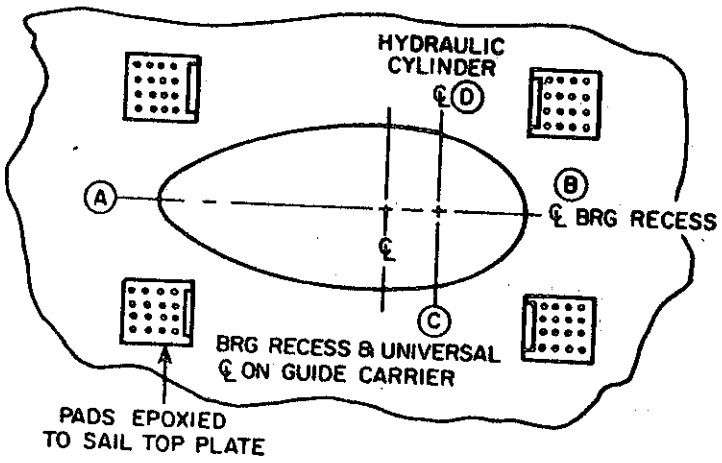


Figure 2-3. Installing Thread Lines on Sail Top Opening

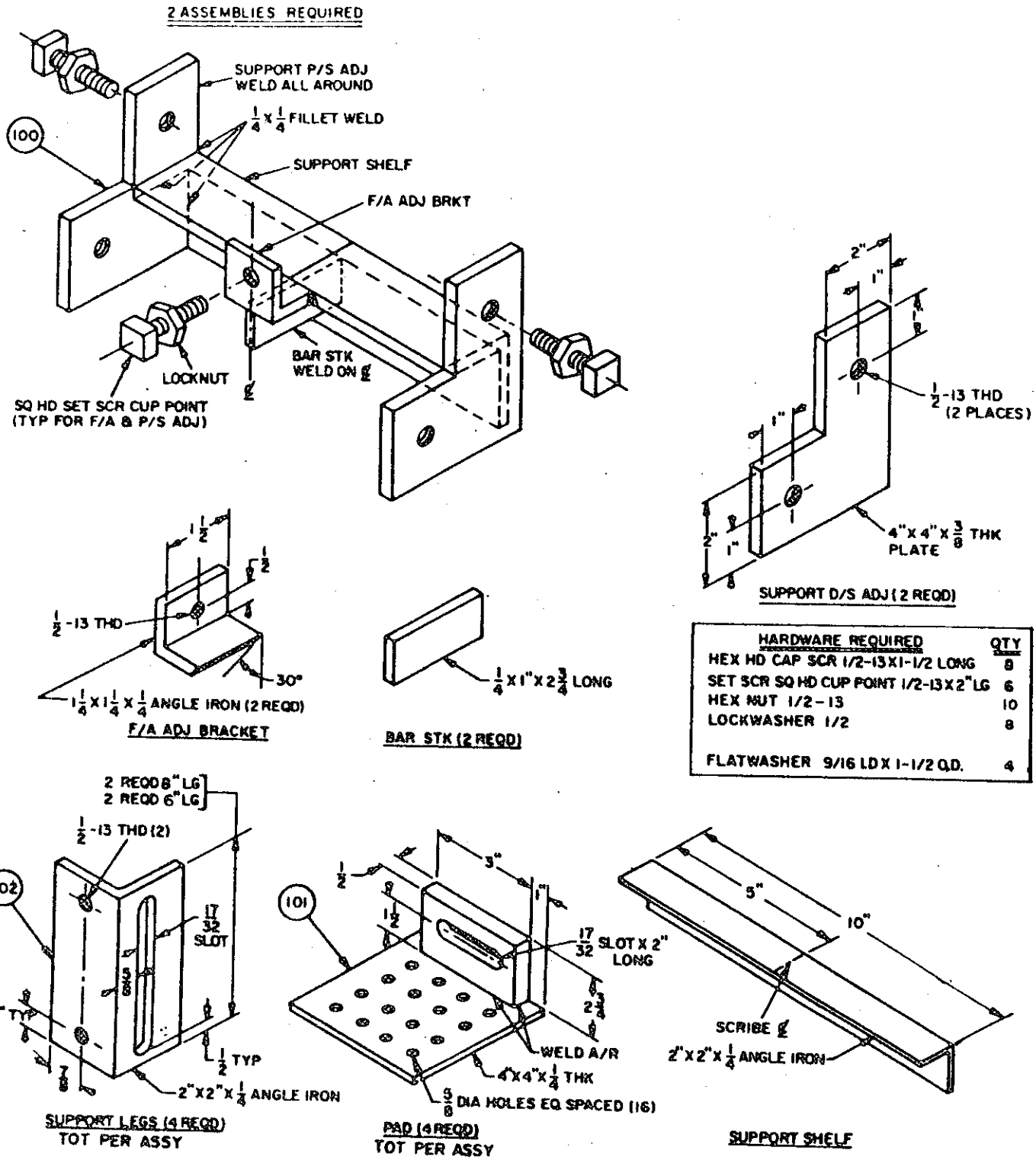


Figure 2-4. Alignment Fixture Support Assembly Details

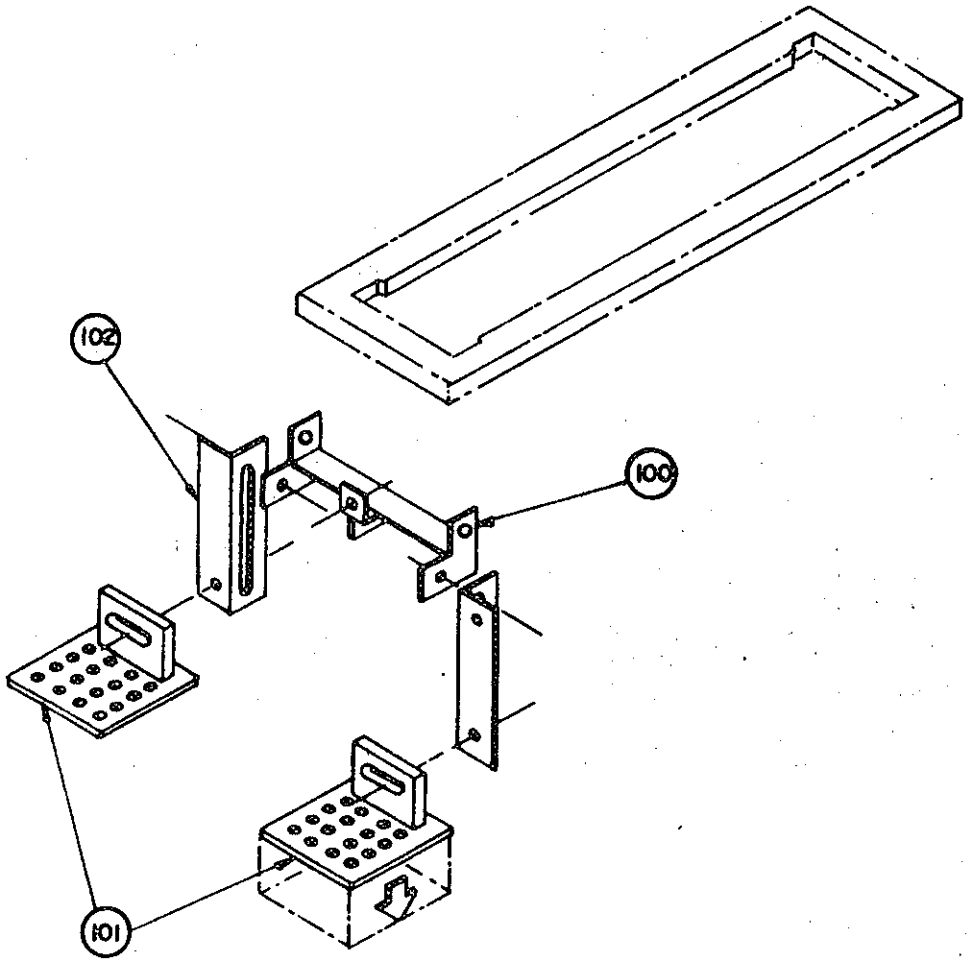


Figure 2-5. Telescope Carrier Assembly

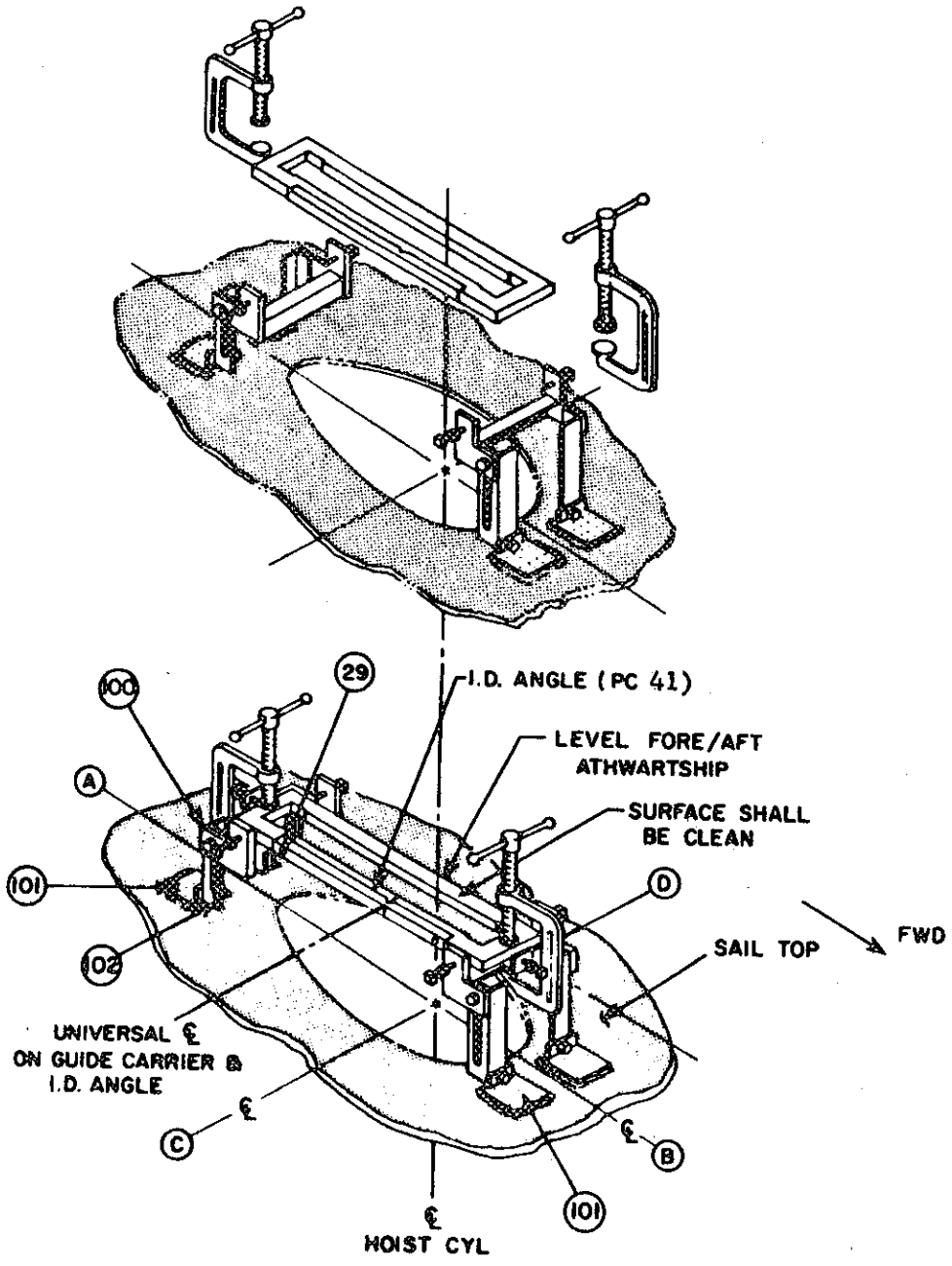


Figure 2-6. Installing Alignment Fixture Support Assembly and Foundation onto Sail Top

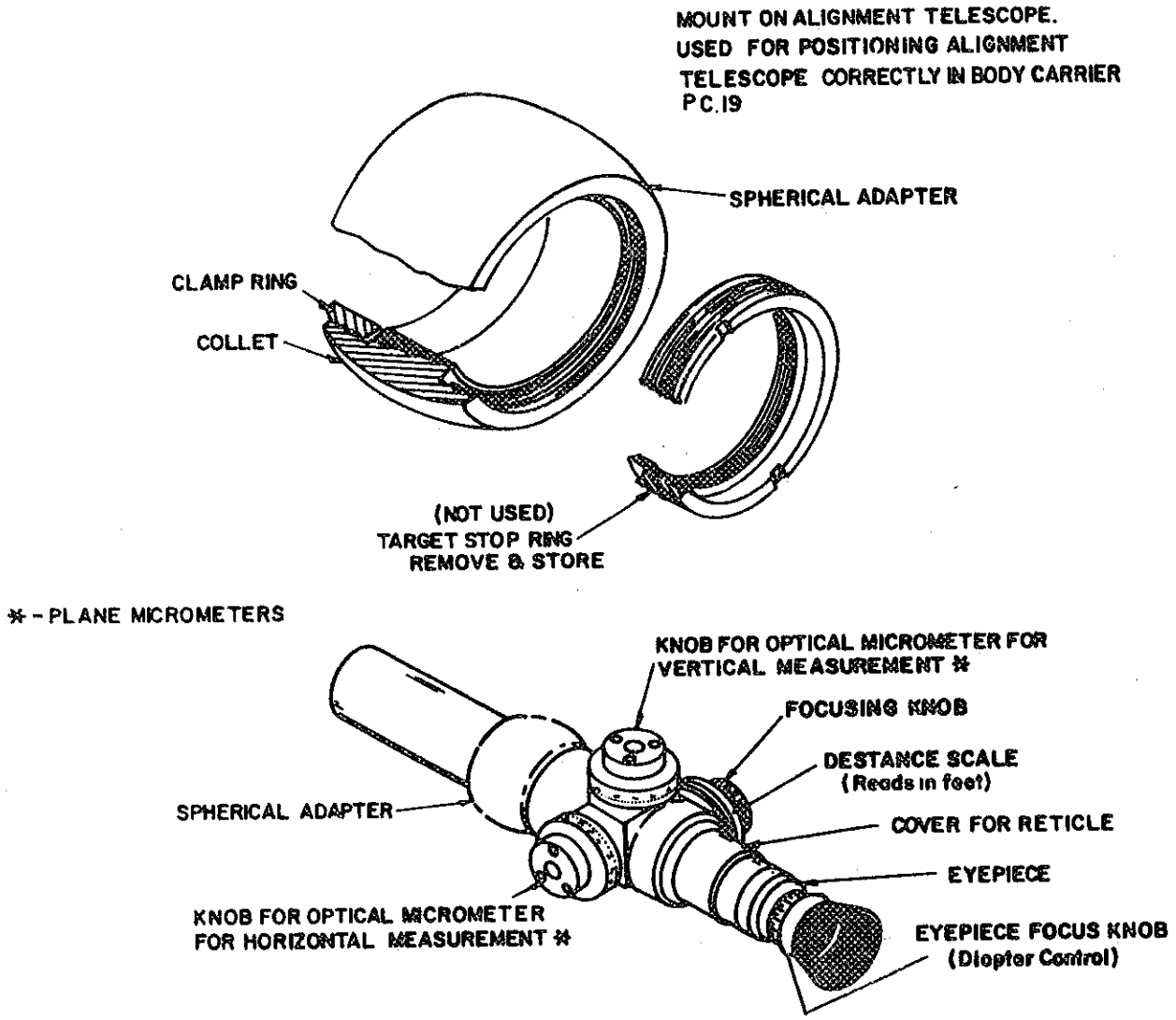


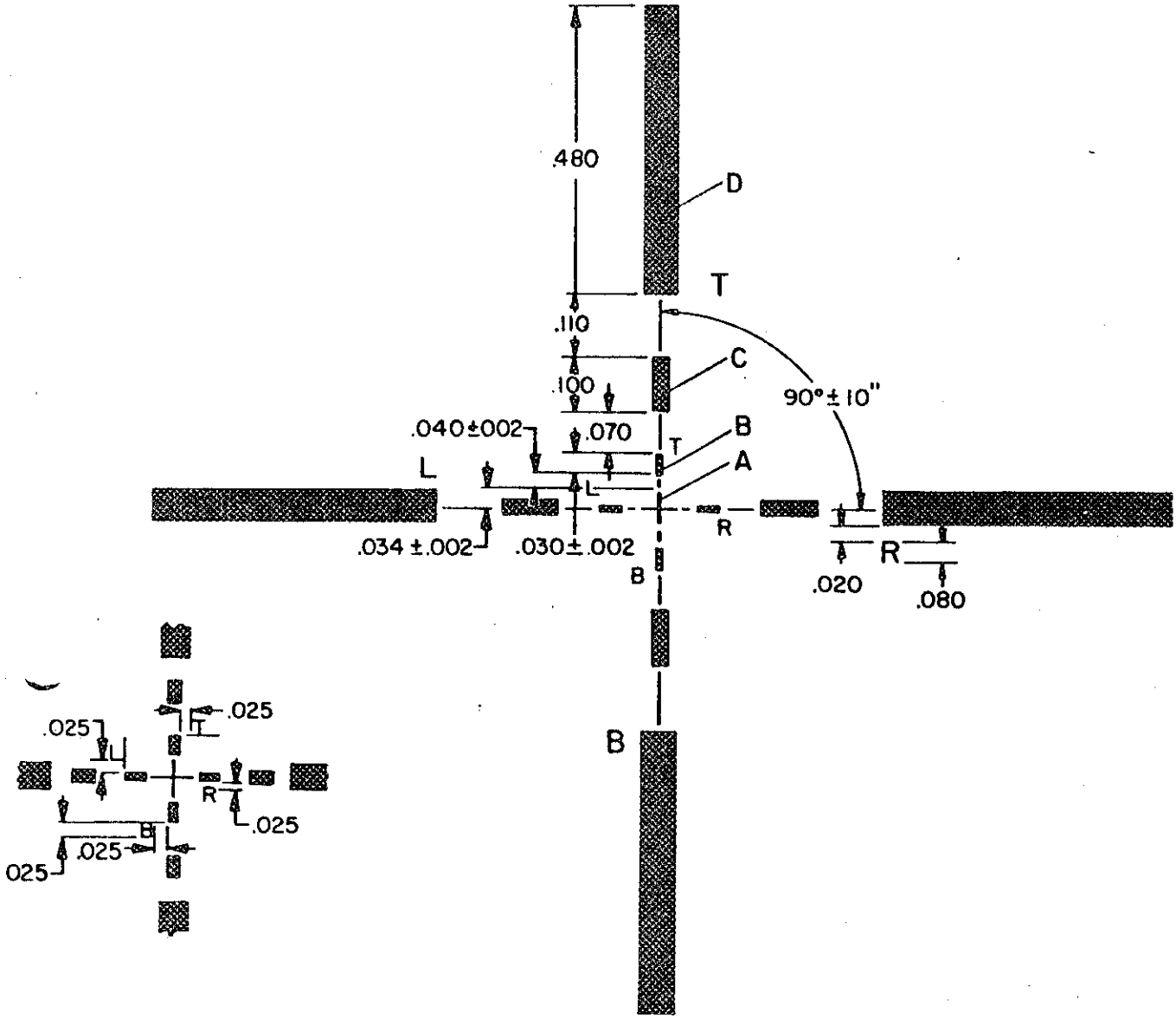
Figure 2-7. Alignment Telescope

STEP 1 Remove and store the target stop ring from the spherical adapter.

CAUTION

Do not overtighten the collet or the telescope's optical system will be damaged.

STEP 2 Mount the telescope's body carrier, Pc. 19, in the sail top guide carrier, Pc. 31. Install the spherical adapter (K & E #71-5100) over the telescope barrel and snug the collet with the spanner wrench (K & E #71-5102).



DIMENSIONAL INFORMATION PERTAINING TO THE
K & E TARGET MIRROR #71-6250

Figure 2-8. K & E Target Mirror #71-6250

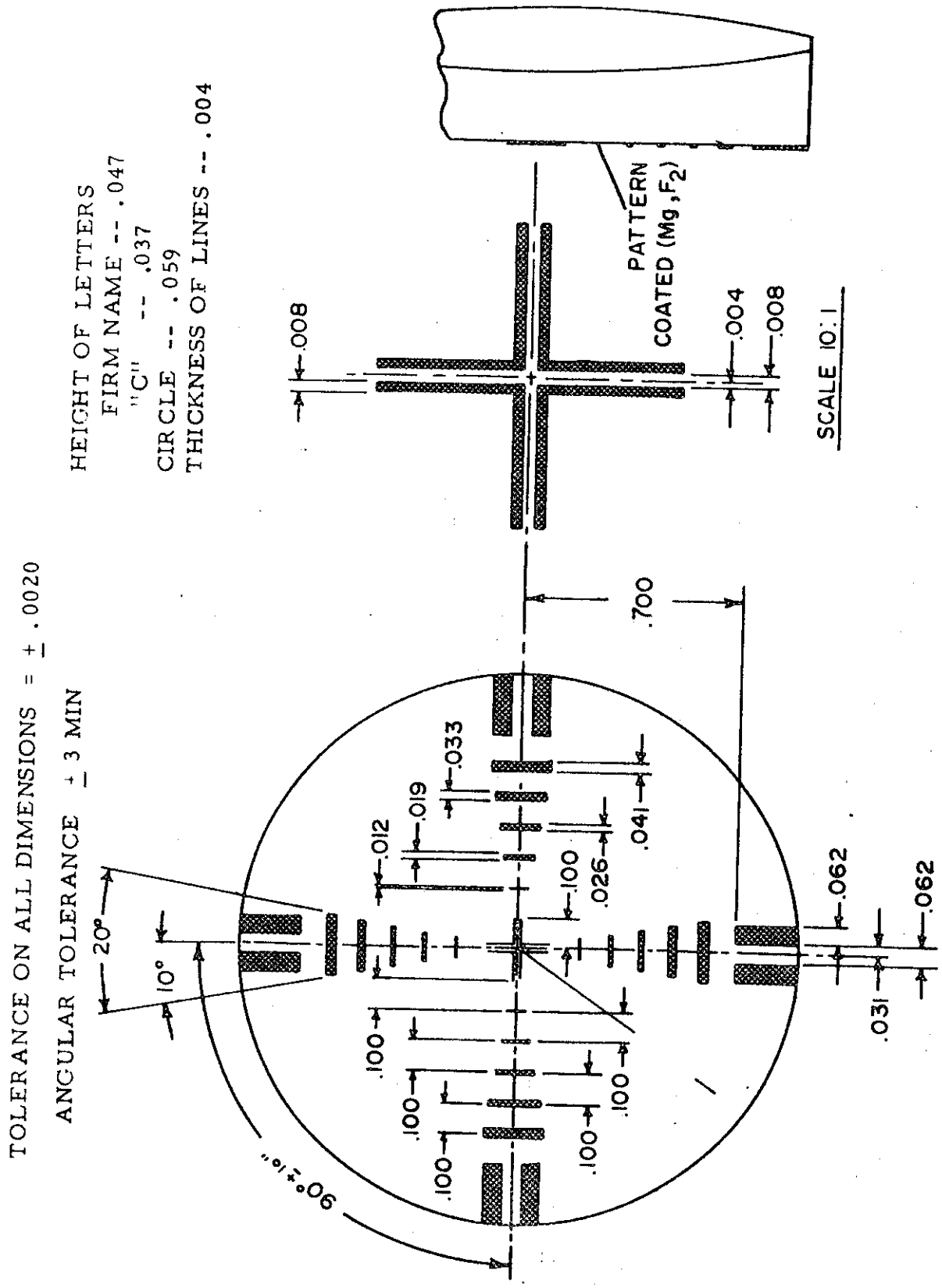


Figure 2-9. K & E Auto-Reflection Target #71-2022

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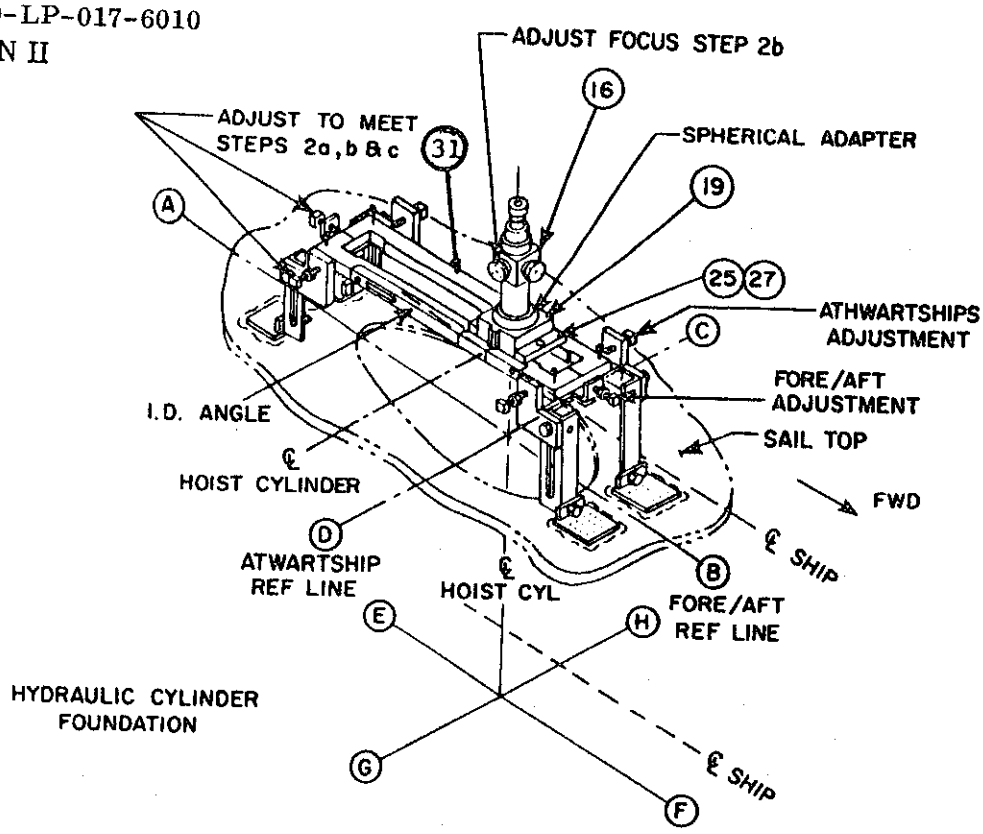

Figure 2-10A. Establishing the Line of Sight

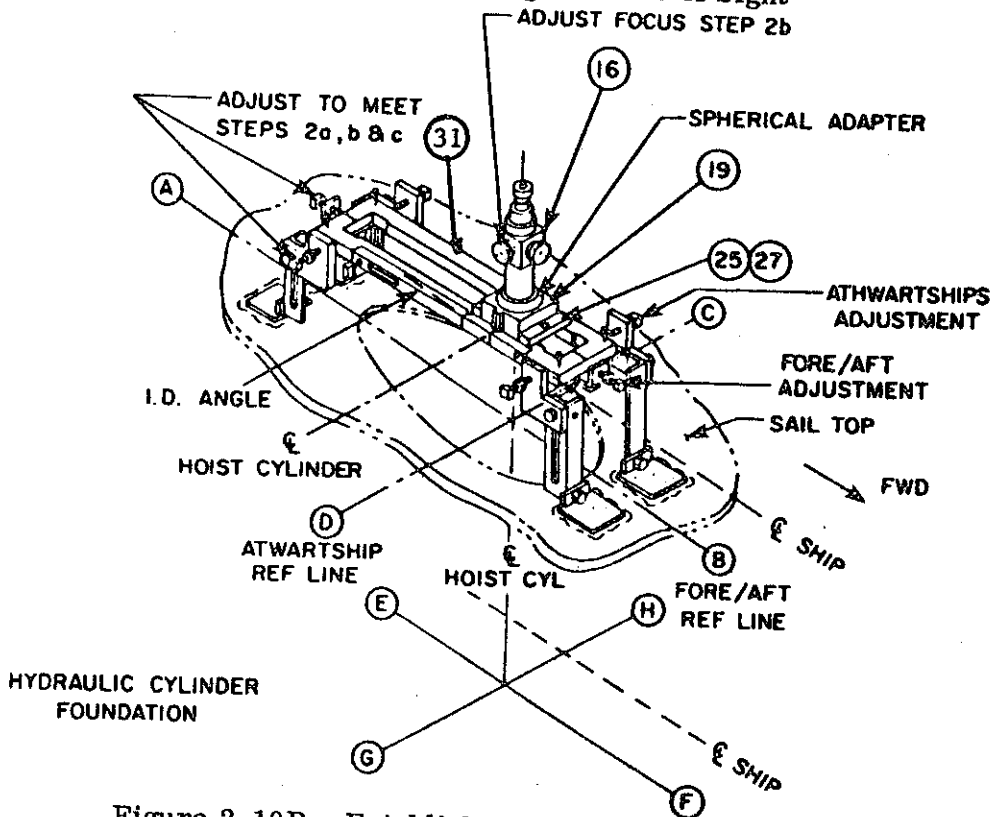

Figure 2-10B. Establishing the Line of Sight

STEP 1 Set the alignment telescope micrometers (two planes) to zero.

STEP 2 Remove the "C" clamps from the guide carrier and position, adjust and lock the guide carrier in the sail top fixture assembly with the adjusting screws when all the following exist:

a. The centerline of the body carrier, Pc. 19, coincides with the hoist cylinder centerline on the identification angle.

b. The line of sight when focused and refocused coincides with the intersection of hull and sail top reference lines.

c. The telescope's line of sight tracks the fore-aft thread on the sail top when the body carrier is moved to any position in the guide carrier.

NOTE

To change the elevation of the guide carrier and assure positive restraint, always tighten the elevation (vertical) adjusting screws.

STEP 3 Using the alignment telescope in the sail top fixture, establish new fore-aft and athwartship reference lines on the foundation surface. Center punch the point at which these two lines intersect.

NOTE

Intersection of the newly established lines must coincide with the intersection of the original lines.

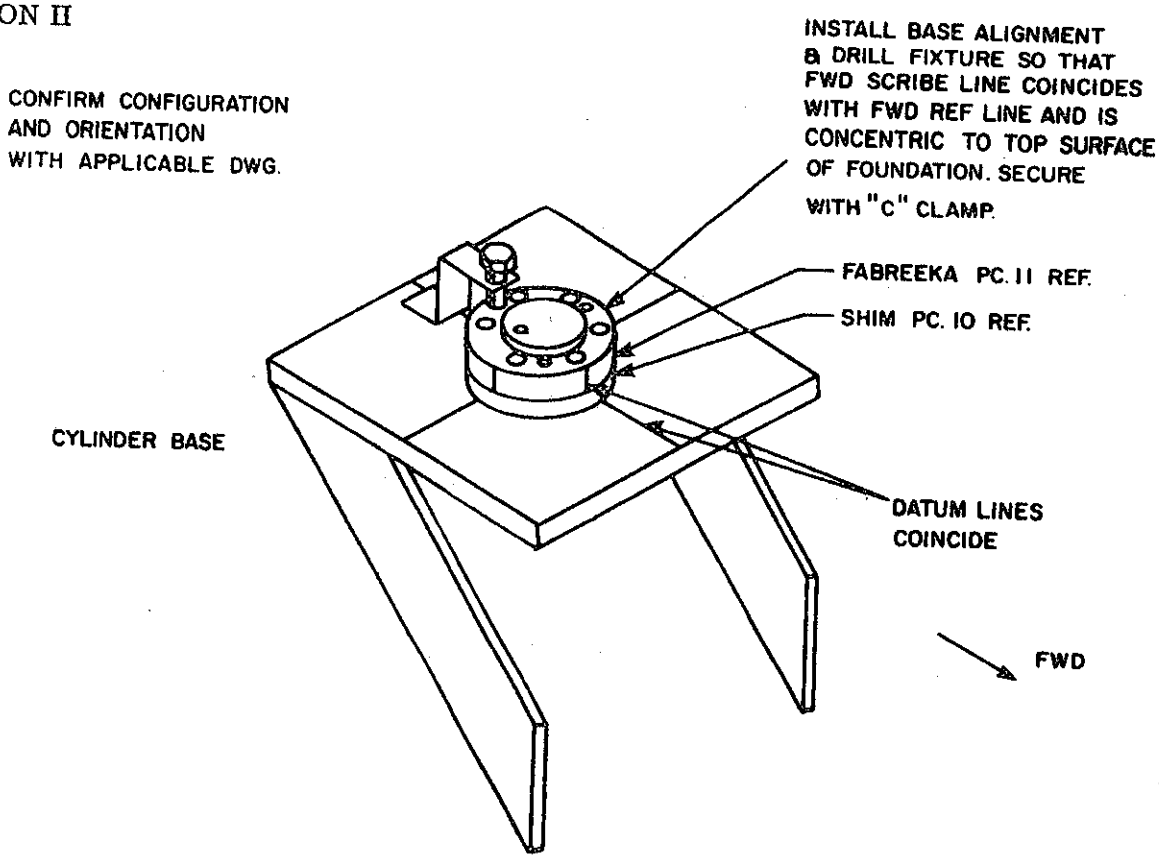

Figure 2-11. Preparation of the Hoist Cylinder Base Foundation

STEP 1 Check the hoist cylinder base foundation top for straightness. Machine the top surface of the shim, Pc. 10, Reference e, to correct for unevenness in the cylinder base foundation. Establish the fore-aft and athwartship reference lines on the top surface of the cylinder base foundation. Check against the applicable drawing for configuration and orientation.

STEP 2 Clean off the recess for the target mirror in the cylinder base drill and alignment fixture, Pc. 1, and then install the target mirror.

STEP 3 Center the drill and alignment fixture on the cylinder base foundation top and then "C" clamp it when the fixture datum line coincides with the cylinder base fore-aft line.

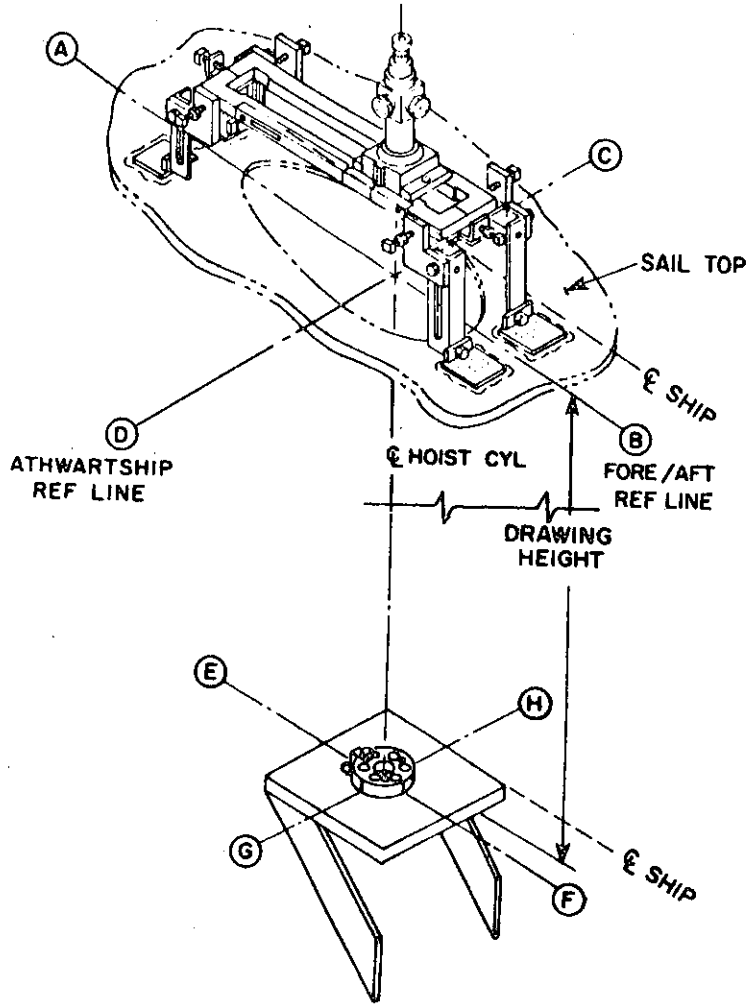

Figure 2-12. Fitting Cylinder Base Foundation to Hull

STEP 1 Using temporary supports, wedges, etc., orient, position, and align the cylinder base foundation to the line of sight. The target mirror center shall coincide with the line of sight and the mirror top shall be perpendicular to it. Refer to applicable engineering standards for tolerance.

STEP 2 Tack weld the cylinder base foundation to the bulkhead preserving the alignment. Remove the alignment fixture from cylinder base foundation top.

STEP 3 Determine the amount the cylinder base foundation supports must be cut down to be in accordance with the fore-aft and athwartships on the installation drawing. Double check the height by measuring the distance to the sail top.

STEP 4 Scribe the bulkhead contour on the cylinder base foundation supports using the prepared batten.

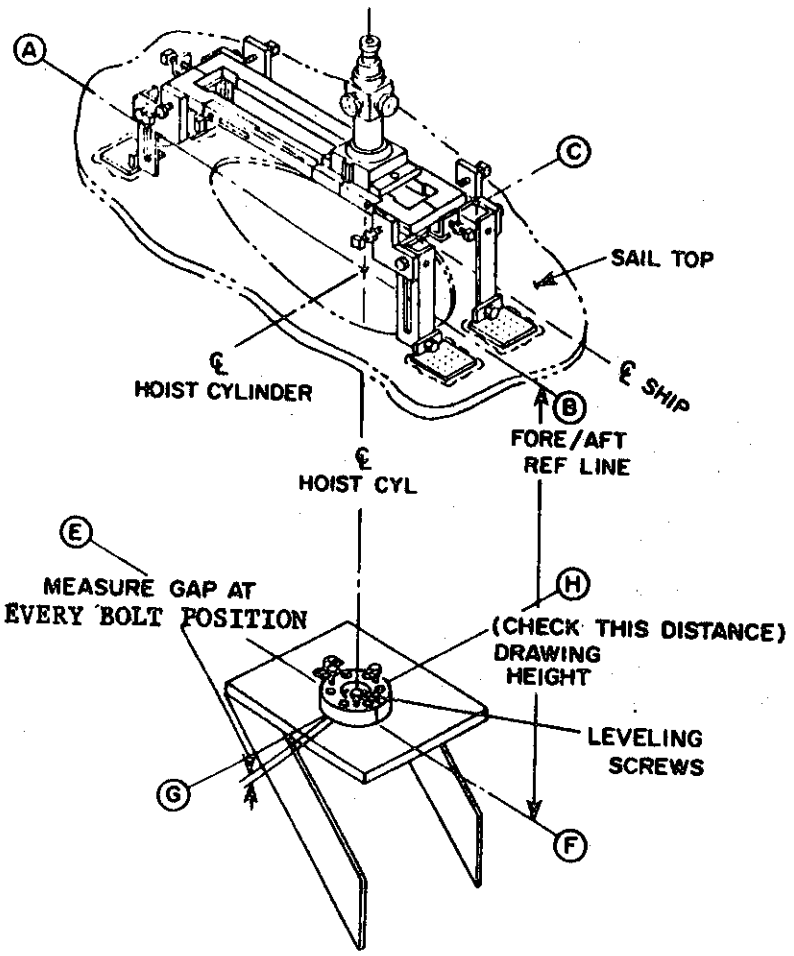

Figure 2-13. Final Alignment of Cylinder Base Foundation

STEP 1 Remove the cylinder base foundation from the bulkhead foundation and cut off the excess metal from the scribed line. Trip and dress-up the cut until the base foundation supports conform to the bulkhead contour and the welding requirements.

CAUTION

Control the weld to minimize distortion of the aligned foundation.

STEP 2 Install and clamp the cylinder base drill and alignment fixture to the cylinder base foundation top. Orient, position and align the base foundation to the line of sight and then tack weld it. Remove the drill and alignment fixture and complete the welding.

STEP 3 Due to possible welding distortion, readjust the sail top guide carrier so that it is aligned with the intersection of the original layout lines on the cylinder base foundation top, and then establish a new fore-aft reference line on the cylinder base foundation top by using the alignment telescope.

NOTE

Minor adjustments to the guide carrier on the sail top must not invalidate the telescope tracking the sail top fore-aft reference line.

STEP 4 Reinstall the drill and alignment fixture on the cylinder base foundation top causing the fixture forward datum line to coincide with the foundation top fore-aft reference line. Position the alignment fixture so that the target mirror center coincides with the line of sight. By auto collimation or auto reflection the top surface of the target mirror shall be made perpendicular to the line of sight. Use the (3) leveling screws on the fixture to achieve perpendicularity.

STEP 5 Clamp the drill and alignment fixture to the cylinder base foundation top, preserving the alignment.

STEP 6 Measure, identify and record the space gap between the cylinder base foundation top and the underside of the drill and alignment fixture at each stud location. Use either a depth micrometer or a feeler gauge.

STEP 7 Machine the taper shim to suit the deviation in readings obtainable from the preceding step, and using a 0.500 inch thick shim, assign it to the location with the highest gap reading.

STEP 8 Install the drill bushing in the cylinder base drill and alignment fixture and drill the bolt hole locations in the cylinder base foundation top.

STEP 9 Remove the drill and alignment fixture.

STEP 10 Deburr the top area of each hole on the cylinder base foundation.

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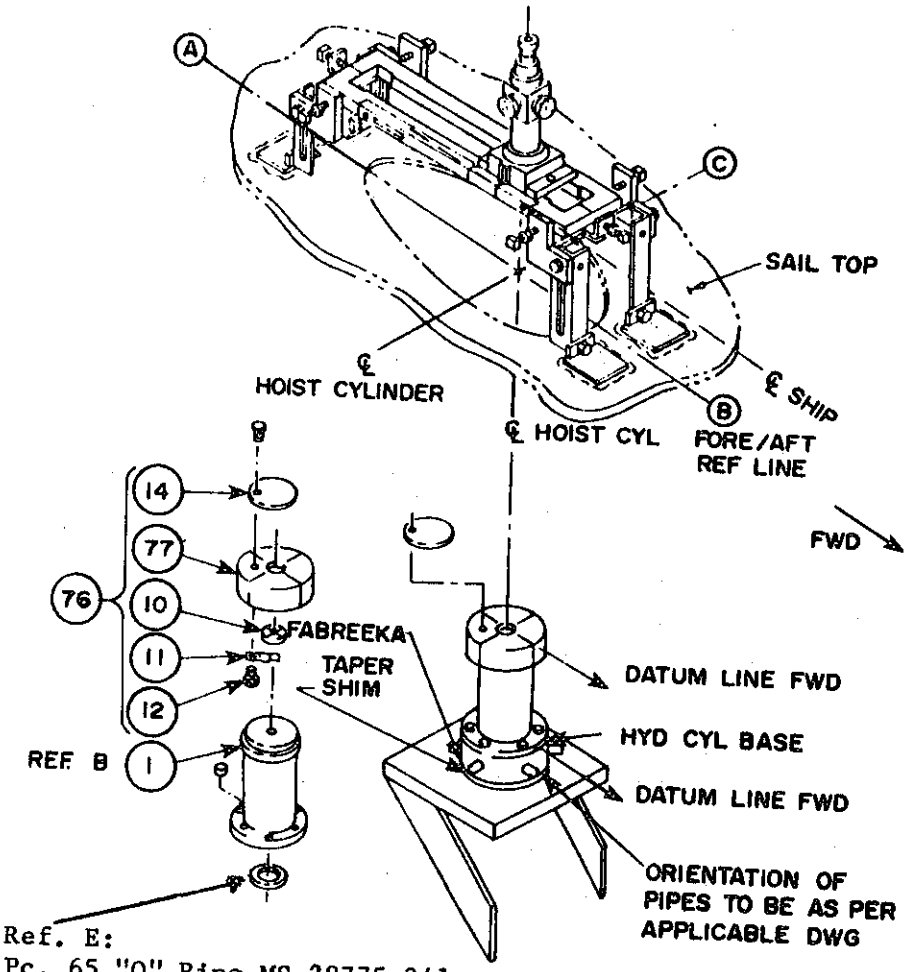

Ref. E:
Pc. 65 "O" Ring MS 28775-341
Pc. 66 Back Up Ring MS 28782-44

Figure 2-14. Orient and Install Cylinder Base

STEP 1 Install the machined hoist cylinder base taper shim and the Fabreeka pad on the cylinder base foundation. Orient, install, and secure the hoist cylinder base with the attached modified flushing block on the Fabreeka pad. Install the target mirror and cap, Pc. 77, on the top of the flushing block. Use bolts and elastic stop nuts for securing the hoist cylinder base.

STEP 2 Recheck the alignment of the hoist cylinder base and record the final position and perpendicularity readings. Rework the shim as required to achieve perpendicularity.

STEP 3 Install hydraulic piping on the hoist cylinder base. Maintain alignment by auto collimation while piping is being welded and make corrections as necessary. Piping shall be designed to allow at least 1/8 inch vertical motion of base under shock load and shall be installed in a manner that does not move the cylinder base out of position.

STEP 4 Flush and test the hoist cylinder base and piping in accordance with applicable procedures.

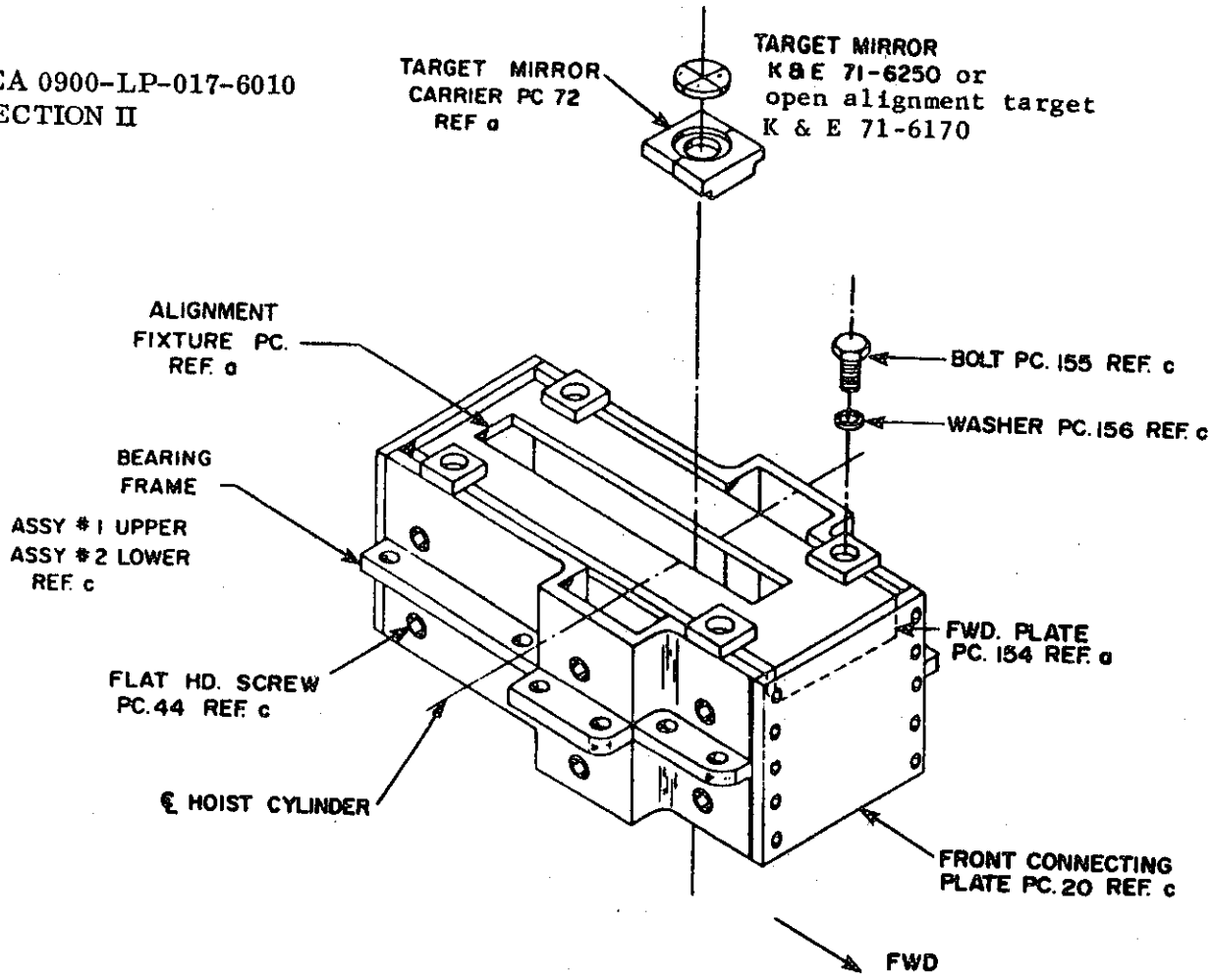

Figure 2-15. Positioning Alignment Fixture on Bearing Frame Top.

STEP 1 Place the alignment fixture assembly, Pc. 151, on the top and bottom of the upper and lower bearing frames. Ensure that the fwd plate, Pc. 154, is flush against the front connecting plate, Pc. 20.

STEP 2 Use inside micrometer to place the fore-aft ends of the alignment fixture centerline in the center of the forward and after bearing frame plates, Pc. 20.

STEP 3 Secure alignment assembly, Pc. 151, to bearing frame with washers, Pc. 156 and bolt, Pc. 155.

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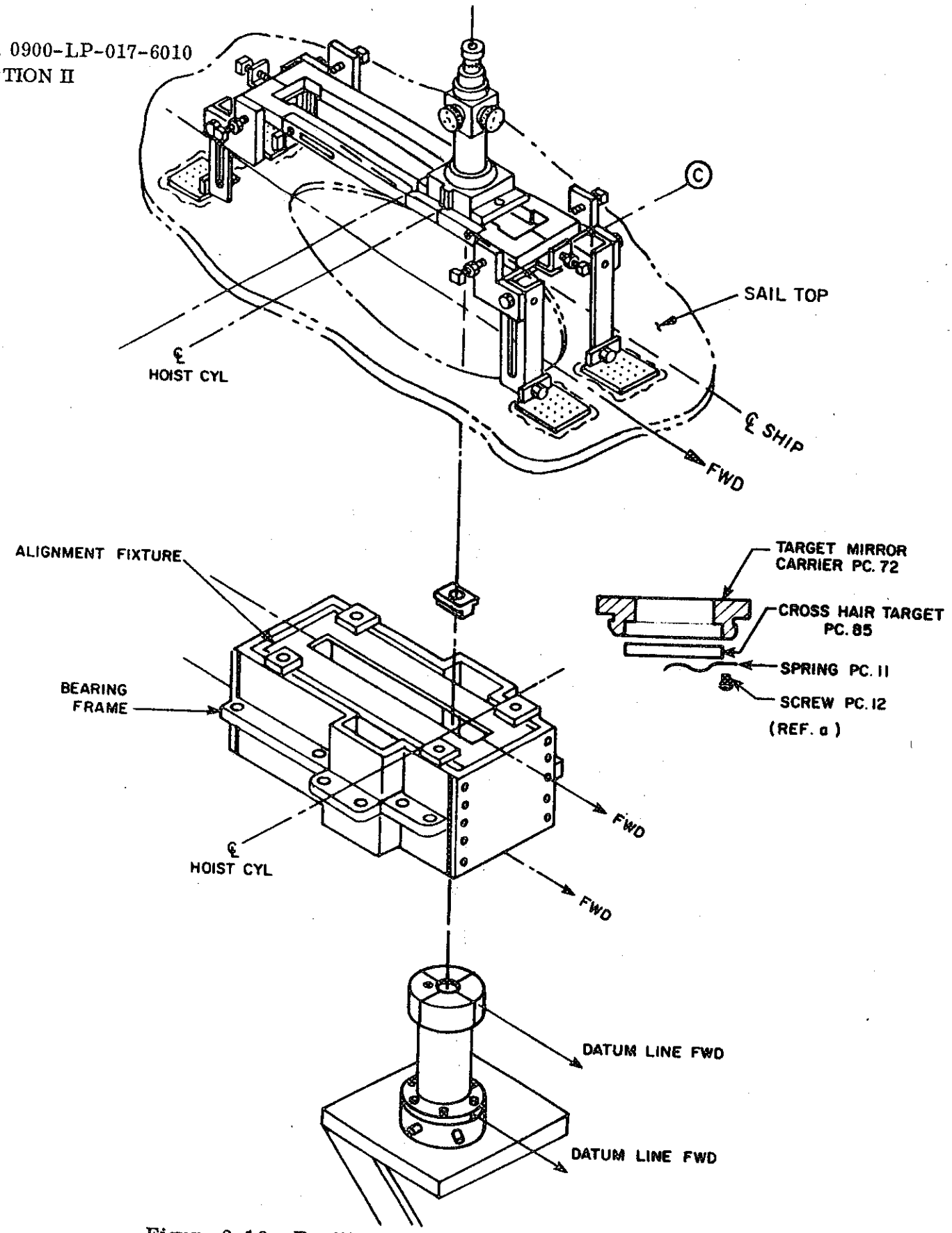


Figure 2-16. Positioning Bearing Frame

STEP 1 Install the cross hair target Pc. 85, in the carrier Pc. 72, and secure with spring, Pc. 11, and screw Pc. 12. Place this assembly in the upper and lower alignment fixture Pc. 151 of the upper bearing frame.

STEP 2 Place and align the bearing frame assemblies on the bearing frame flat (foundation), and then scribe the outer contour (plus 1/4" inch clearance) of the bearing frame on the foundation plate. Burn out the area of the plate within the scribe line.

STEP 3 Position the upper frame/fixture assembly on the bearing frame flat and align it with the combined assembly to locate the jacking clips for welding. (See Figure 2-16.) Jacking clips will be used for final positioning of the bearing frame to the aligned position. (See Figure 2-16.) To accomplish this, proceed as follows:

a. Align the sail top telescope holder centerline with the hoist cylinder centerline on the identification angle, Pc. 41.

b. Align the upper bearing frame carrier target centerline Pc. 72 with the hoist cylinder athwartships centerline on the alignment fixture, Pc. 151.

c. Focus the telescope and position the bearing frame cross hair target, Pc. 85, so that the center is aligned with the line of sight which tracks the target center when the telescope carrier and carrier target are moved to any position in the guide carrier.

STEP 4 Weld six (6) jacking clips to the top of the bearing frame flat foundation. Leave about 5/8 inch space between jacking clip and bearing frame for positioning room. Position of jacking clips to be as follows:

a. one forward

b. one aft

c. two on each side (one forward and one aft).

STEP 5 Align (position, angle, and orientation) the bearing frame with the line of sight, using the vertical and the horizontal jacking screws (use 1/2-13 screws). To accomplish this, proceed as follows:

a. Align the sail top telescope body carrier centerline with the hoist cylinder centerline on the identification angle.

b. Align the upper bearing frame carrier target, Pc. 72, centerline with the hoist cylinder centerline on the alignment fixture, Pc. 151.

c. Focus the telescope and position the bearing frame with the adjusting screws until:

(1) Center of the cross hair target, Pc. 85, coincides with the reticle center of the alignment telescope.

(2) The line of sight tracks the target center when the telescope carrier and target mirror carrier, Pc. 75 is moved to any position in the guide carrier and alignment fixtures, Pc. 151.

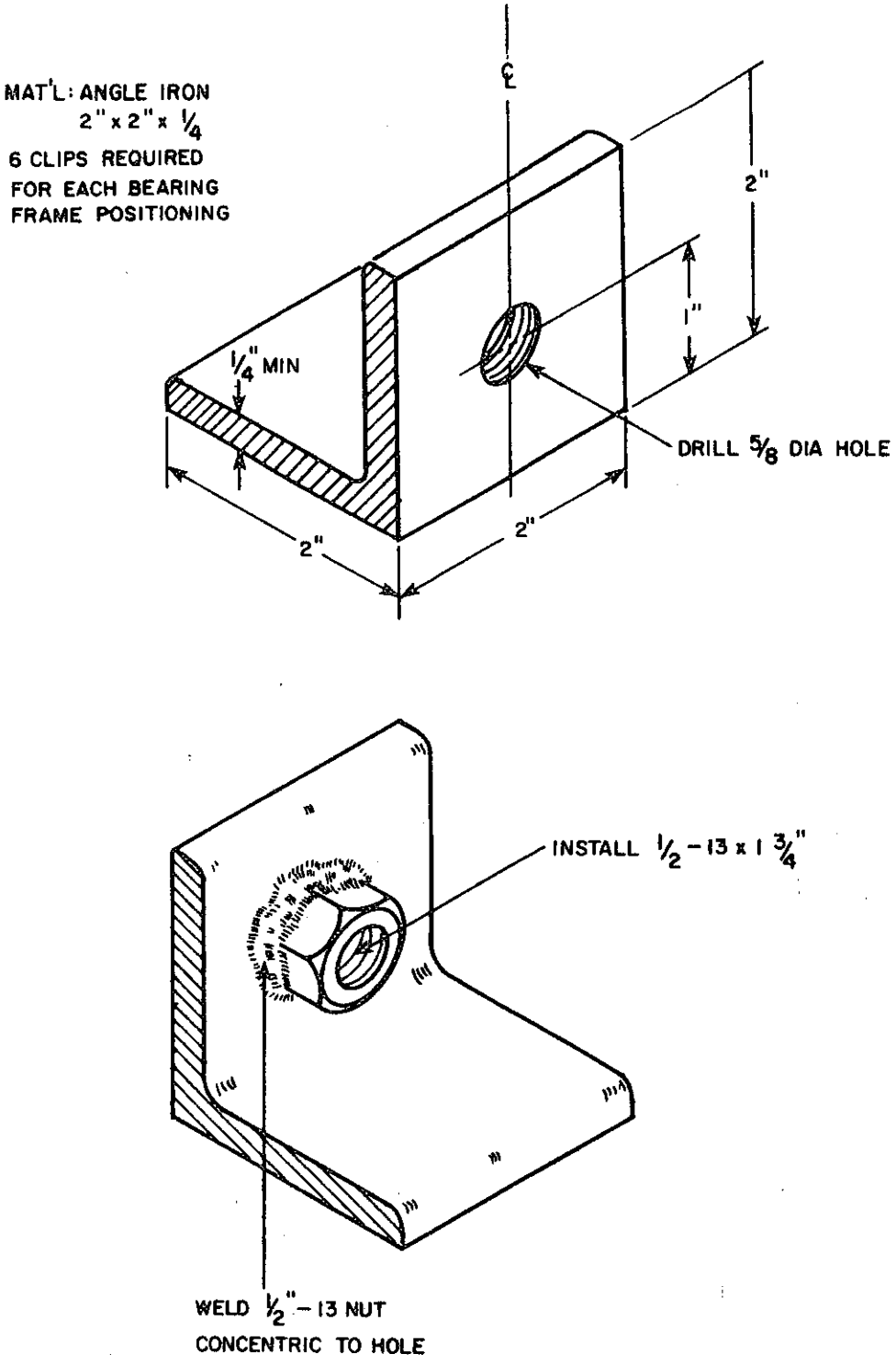


Figure 2-17. Jacking Clips For Restraining Bearing Frames Manufacture (12)

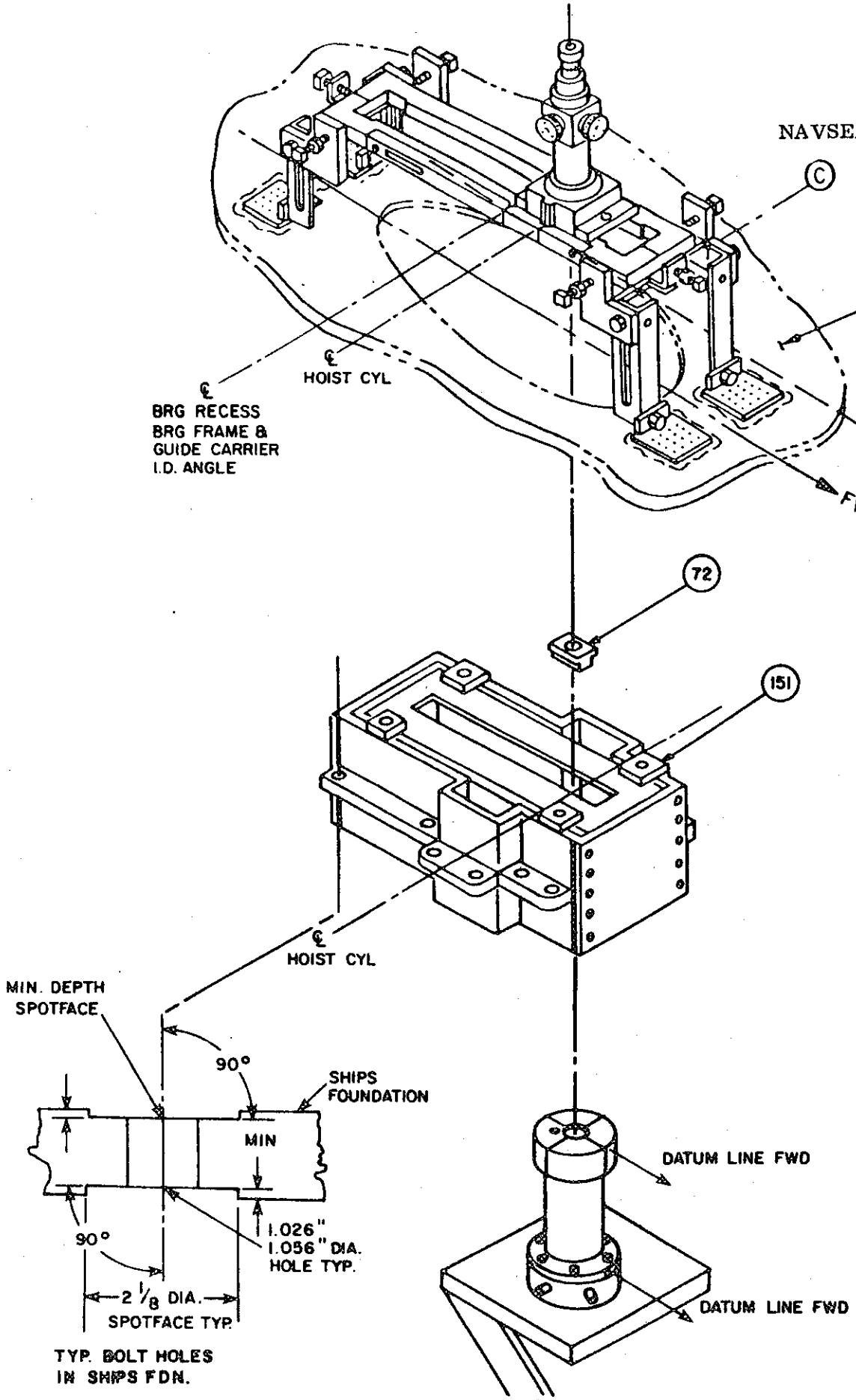


Figure 2-18. Aligning the Bearing Frame

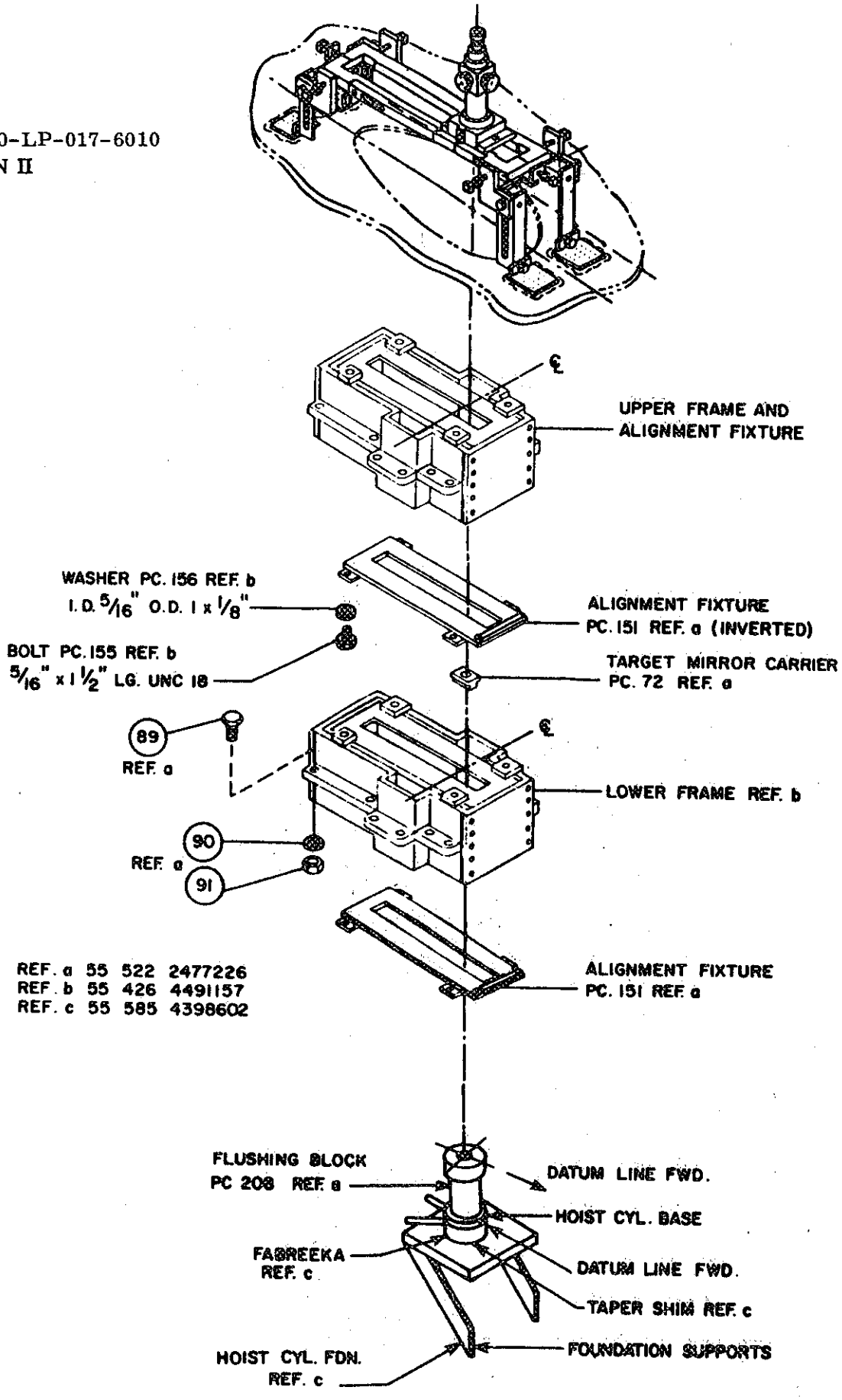


Figure 2-19. Alignment Set-Up

STEP 1 (See Figure 2-19.) Position the bearing frame on the foundation plate and then align it with the adjusting (jacking) screws until all of the following exist:

a. The sail top telescope holder centerline coincides with the hoist cylinder centerline on the identification angle.

b. The bearing frame carrier target centerline coincides with the hoist cylinder centerline on the alignment fixture, Pc. 151.

c. The telescope is focused and the bearing frame is positioned with the adjusting screws until:

(1) The target center coincides with the reticle center of the alignment telescope.

(2) The line of sight tracks the target center when the telescope carrier and the target mirror carrier, Pc. 72 is moved to any corresponding position in the guide carriers.

STEP 2 Place a 5/8" drill bushing, Pc. 158, in the bearing frame flange bolt holes and drill 12 holes 5/8 inch in diameter.

NOTE

After each hole is drilled, place a temporary 5/8" bolt, washer and nut as a hold down.

STEP 3 Drill twelve (12) holes 1-7/64 inch through bearing flange and foundation and secure with 1 inch diameter temporary bolts, nuts and washers. Space bolts one at each corner and two in the middle of the flange.

STEP 4 (See Figure 2-20.) Remove the bearing frame and spot-face the top and bottom surfaces of the foundation plate for the bearing frame shims and bolts, to a diameter of 2-1/8 inches concentric to, and normal to, the hole (12 places). Remove minimum amount of metal to clean up surface only and chamfer square edges.

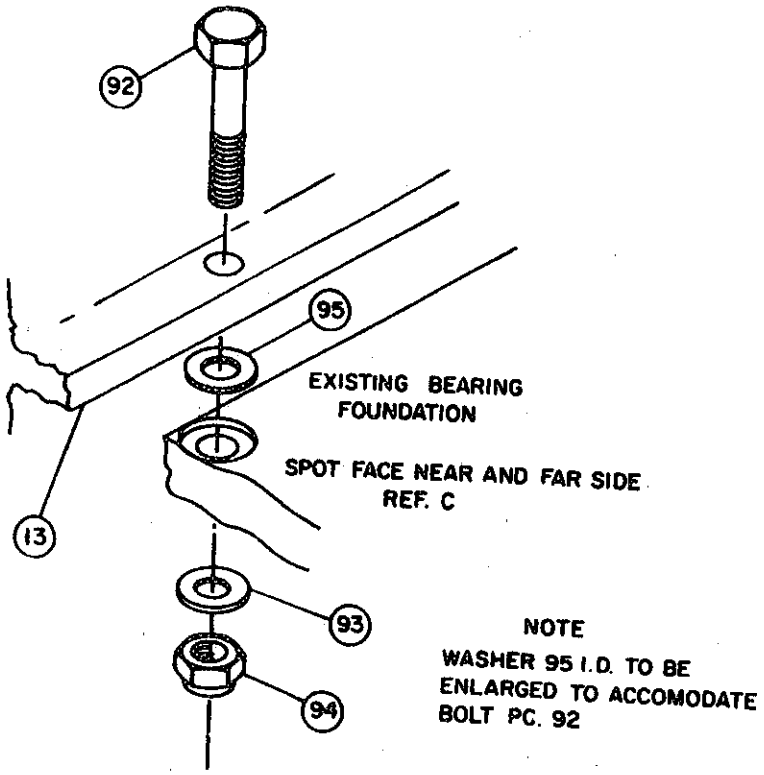


Figure 2-20. Bearing Frame to Ship's Foundation Bolting Hardware

STEP 5 Measure, identify and record the gap clearance between the underside of the bearing frame flange (bottom) and the spot-faced surface of the bearing frame foundation plate. Measurements shall be taken in the spot-face area of each bolt hole.

STEP 6 Line ream two (2) holes through the bearing frame flange and the foundation plate. One hole portside forward and the other hole starboard side aft using a 1.026" minimum diameter to a 1.156" maximum inch diameter reamer. Deburr roll-up edges resulting from reaming operation.

STEP 7 Machine the body of the bolts to provide a 0.0005" clearance or to a 0.001" interference fit on the diameter when installed in the bearing frame and the structural foundation.

STEP 8 Using deviations in dimensions obtained from Step 5 and assigning a 0.500" inch thick shim to the highest gap reading, machine two shims to the required thickness one to each location just line reamed.

STEP 9 Install the shims and tighten the body bound bolt at the two reamed hole locations. Recheck the alignment of the bearing frame and when required, machine the shim thickness to achieve alignment.

STEP 10 Measure, identify and record the gap clearance in the remaining bolt hole locations. Machine ten (10) shims to suit the gap clearance.

STEP 11 Line ream the remaining holes, machine bolts (pc. 92) and washer (pc. 95), deburr and then install the shims and bolts. Tighten all bolts after shims and bolts are in place.

NOTE

The two bolts initially installed and tightened will have to be loosened to permit installation of the remaining shims.

STEP 12 Using the same procedural techniques previously described, align and install the lower bearing frame.

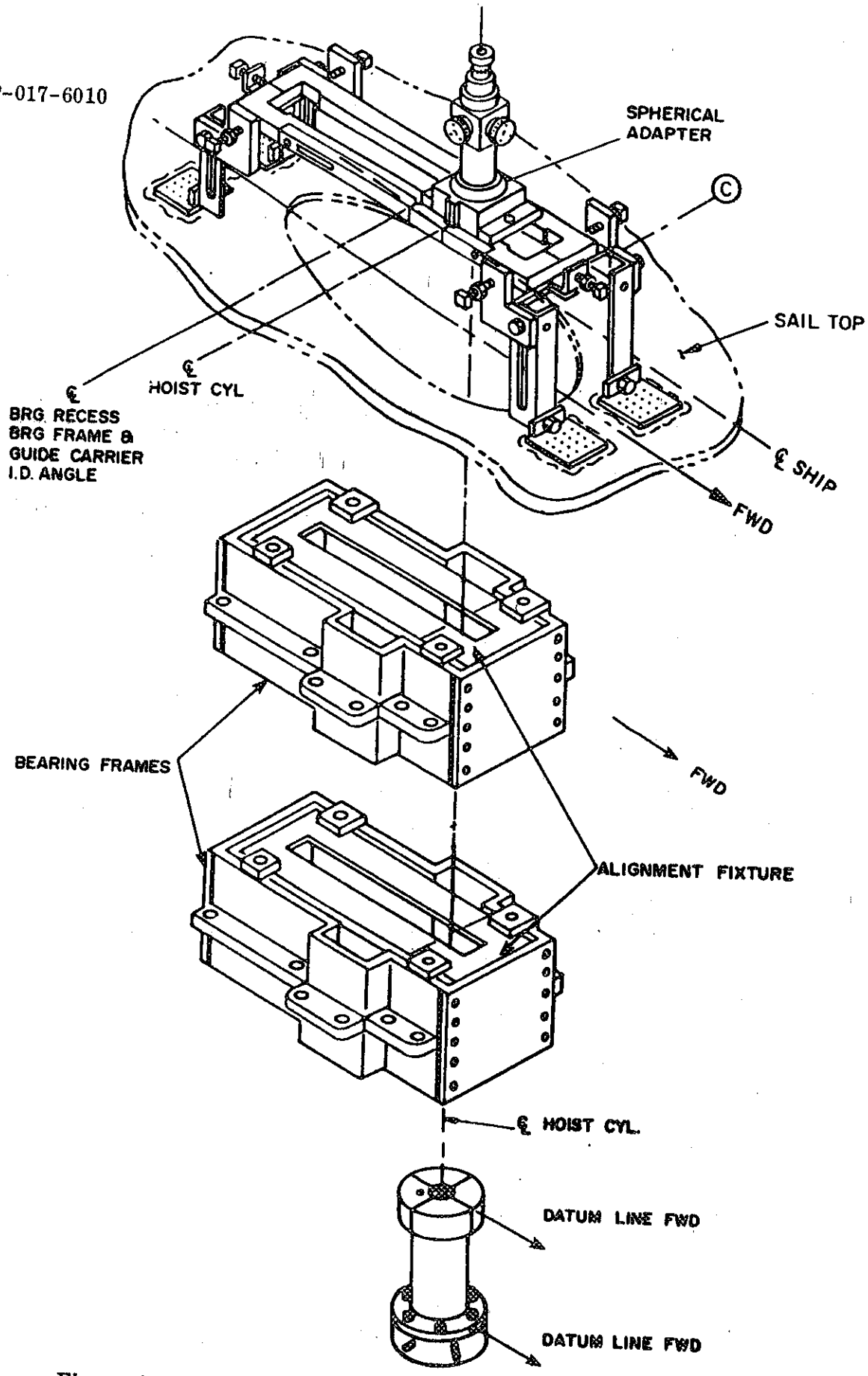


Figure 2-21. Final Alignment Check

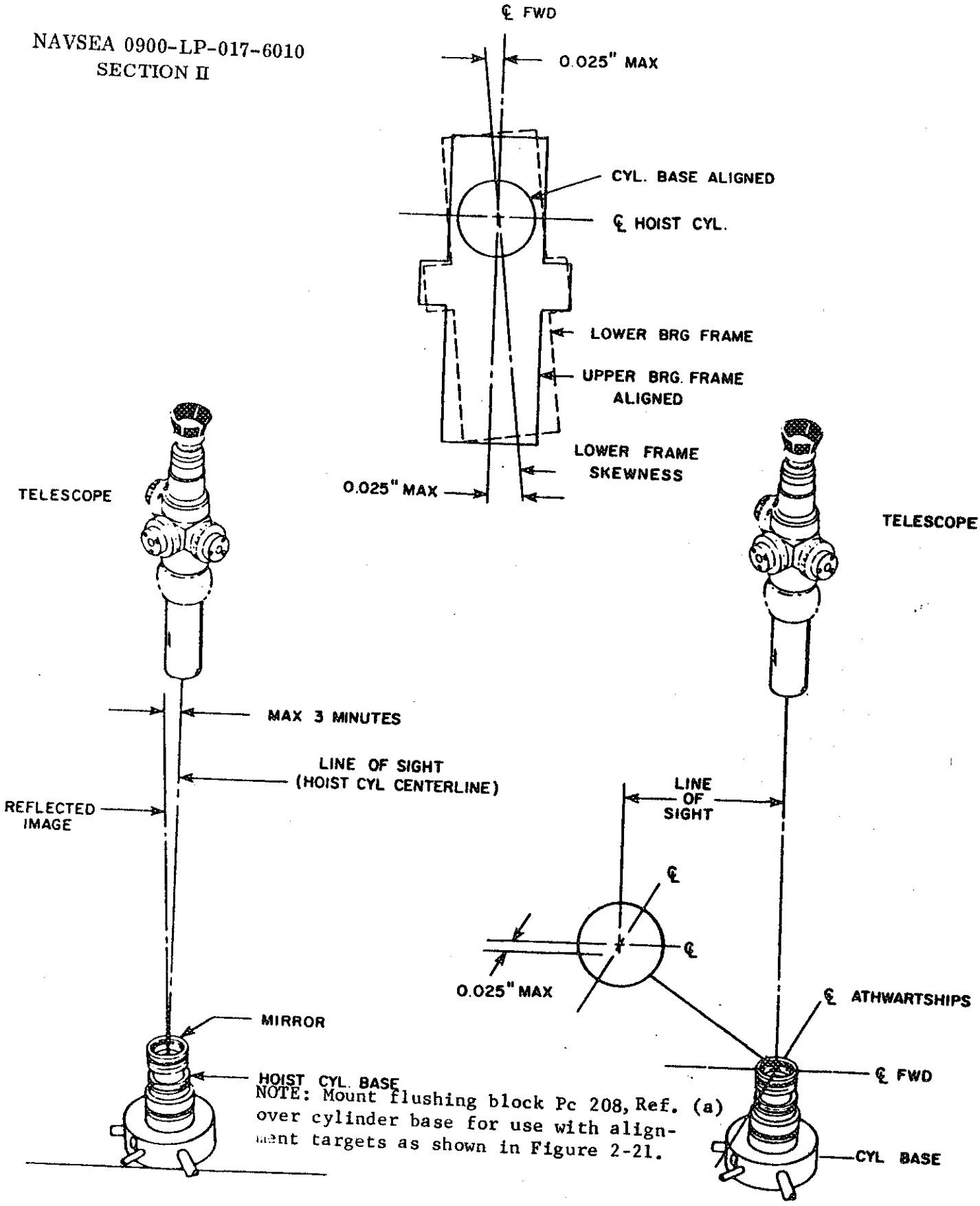
STEP 1 Recheck alignment and record skewness, perpendicularity and position of the upper bearing frame to the line of sight.

STEP 2 Recheck alignment and record skewness, perpendicularity and position of the lower bearing frame to the line of sight.

STEP 3 Retain and place on file all final recorded alignment readings for future reference.

STEP 4 After completing the installation of the hoist cylinder base and mast bearing frames, remove the alignment fixture support assembly from the sail top and all jacking clips from the bearing frame foundation flats within the sail.

STEP 5 Deburr, restore and repaint all metal surfaces disturbed prior to reinstallation of the antenna mast assembly.



NOTE: Mount flushing block Pc 208, Ref. (a) over cylinder base for use with alignment targets as shown in Figure 2-21.

Figure 2-22. Examples of Alignment Acceptance

STEP 1 The plane containing the top surface of the cylinder base shim shall be perpendicular to the hoist cylinder vertical centerline within three (3) minutes of arc.

STEP 2 The vertical plane containing fore-aft centerlines of the faired mast bearing frames shall be within 0.025 inch of the vertical plane containing the fore-aft centerline of the cylinder base. The two (2) planes shall also be parallel to each other within three (3) minutes of arc.

STEP 3 The plane containing the athwartship hoist cylinder centerline of the bearing frame shall be within 0.025 inch of the plane containing the athwartship centerline of the hoist cylinder base.

NOTE

Alignment record form is provided at the back of this procedure for the installing activity that does not already have such a form.

FORM I - RECORDING DATA SHEET FOR UPPER BEARING FRAME

SHIP _____ ANT TYPE _____ DATE _____

1. Distance Reticle Center is off Target Center (3 Decimals)

   a. Top of Upper Bearing Frame Hoist Cylinder Centerline

      FWD _____ AFT _____ PORT _____ STBD _____

   b. Bottom of Upper Bearing Frame Hoist Cylinder Centerline

      FWD _____ AFT _____ PORT _____ STBD _____

   c. Top of Upper Frame Fwd

      PORT _____ STBD _____

   d. Top of Upper Frame AFT

      PORT _____ STBD _____

   e. Bottom of Lower Frame Fwd

      PORT _____ STBD _____

   f. Bottom of Lower Frame AFT

      PORT _____ STBD _____

FORM II - RECORDING DATA SHEET FOR LOWER BEARING FRAME

SHIP _____ ANT TYPE _____ DATE _____

1. Distance Reticle Center is off Target Center (3 Decimals)

   a. Top of Lower Bearing Frame Hoist Cylinder Centerline

      FWD _____ AFT _____ PORT _____ STBD _____

   b. Bottom of Lower Bearing Frame Hoist Cylinder Centerline

      FWD _____ AFT _____ PORT _____ STBD _____

   c. Top of Lower Frame Fwd

      PORT _____ STBD _____

   d. Top of Lower Frame AFT

      PORT _____ STBD _____

   e. Bottom of Lower Frame Fwd

      PORT _____ STBD _____

   f. Bottom of Lower Frame AFT

      PORT _____ STBD _____

FORM III - RECORDING DATA SHEET FOR HOIST CYLINDER POSITION

SHIP _____ ANT TYPE _____ DATE _____

1. Distance Reticle Center is off Target Center (3 Decimals)

FWD _____ AFT _____ PORT _____ STBD _____

FORM IV - RECORDING DATA SHEET HOIST CYLINDER PERPENDICULARITY

SHIP _____ ANT TYPE _____ DATE _____

1. Distance from Bottom of the Telescope Barrel to the Mirror on the Hoist Cylinder Base . Feet _____

2. Distance Reticle Center is off Image Center

   a. Place an "x" in the computation pattern where center of target image appears.

   b. Record: Distance Image Center is to Reticle Center

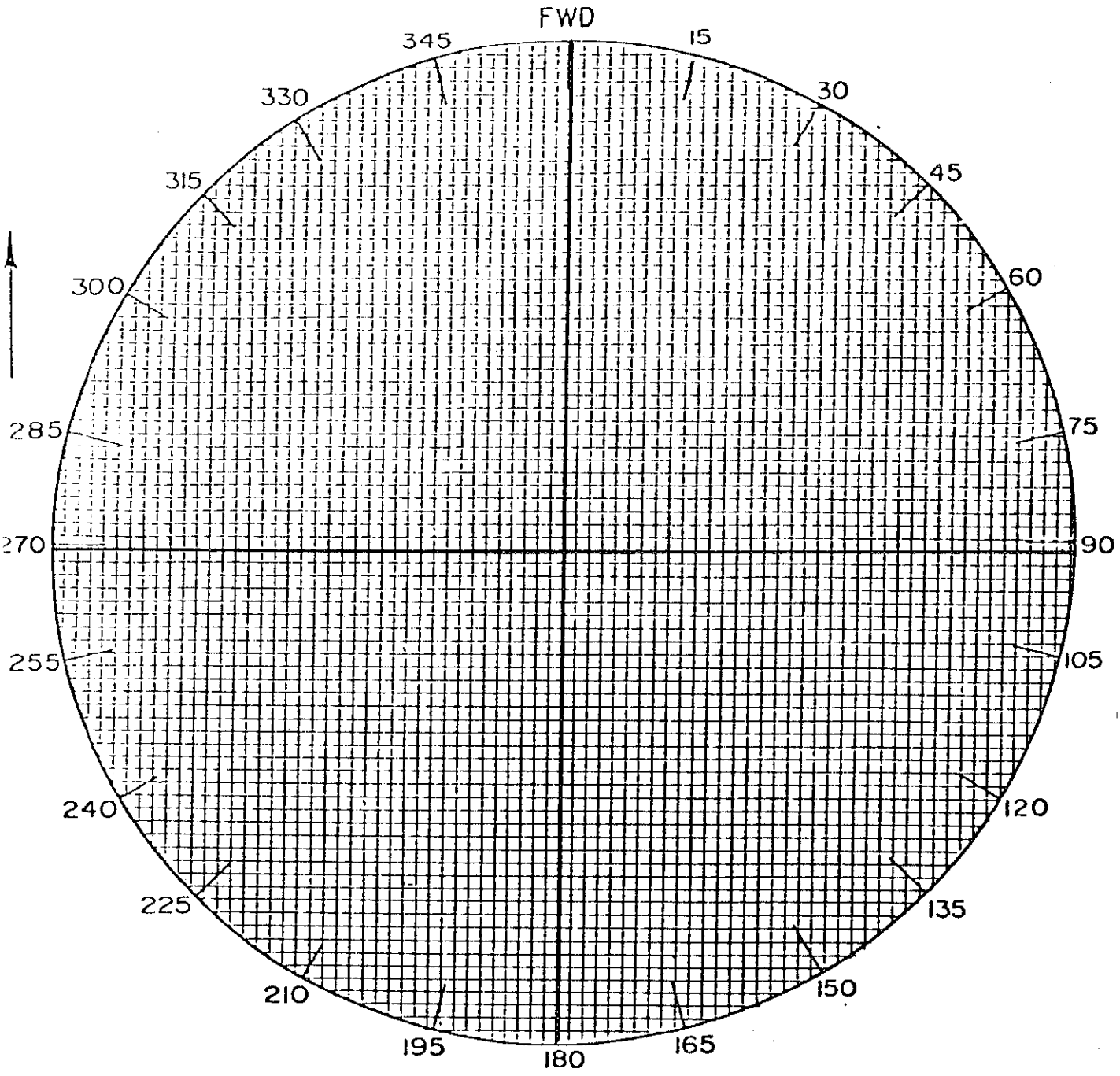
      FWD _____ AFT _____

      PORT _____ STBD _____

   Plot the "x" in the computation pattern on this graph to scale size.

   Measure from the graph center to the "x" center to determine the radial distance.

FORM V - COMPUTATION PATTERN



RADIAL DISTANCE _____

FORM VI - COMPUTATION TABLE

1. Acceptance criteria

a. The hoist cylinder base must be perpendicular within 3 minutes.

①	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
②	.251	.272	.293	.314	.335	.356	.377	.396	.417	.438	.459	.480	.501	.522	.545	.564	.591	.610	.628	.647	.668	.690	.711	.735	.752

1 Distance recorded in Form IV, Para 1 (in feet)
2 Maximum Radial Distance

Table 1. Table of Auto-Reflection Computations

b. Radial distance (from Table) _____

Radial distance (from Graph) _____

2. Hoist Cylinder Base

Satisfactory _____

Unsatisfactory _____

NOTE

Alignment readings shall be recorded at the initial and at the completion of the bolting of the bearing frames and when the hoist cylinder piping is welded.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

LIST OF ILLUSTRATIONS (Cont'd)

SECTION III - SHIPBOARD INSTALLATION OF TRIDENT OE-207A(V)/BR ANTENNA AND MAST ASSEMBLY

I - GENERAL INFORMATION

1-1 INTRODUCTION

a. Purpose. The purpose of this section is to provide procedures for shipboard installation of an assembled Trident OE-207A(V)/BR Antenna and Mast Assembly.

b. Scope. This section defines the method for installation of an assembled Trident OE-207A(V)/BR Antenna and Mast Assembly.

1-2 EQUIPMENT DESCRIPTION

The Antenna Mast Assembly consists of the faired mast assembly, the antenna radome assembly, the hoist cylinder (minus base) and smaller assemblies which are used as the erecting and retracting mechanism. The bearing frame assembly and the hoist cylinder foundation are considered to be previously assembled and properly installed for this procedure.

NOTE

The antenna and mast assembly was assembled and cycle tested by NAVSECPHILADIV. The antenna, with its associated affixed multifunction antenna cable was also pressure tested. The installing activity is requested not to disassemble the mast assembly or disconnect the antenna cable from the antenna radome. The antenna cable roller assembly was removed to ease handling and shipping.

1-3 REFERENCES

(1) SS-904-4398614, Lifting Clamps
(2) SSBN-726-445-4491191-OE-207/BR, Installation Standard Top Drawing
(3) MIL-L-24131, Lubricant, Colloidal Graphite in Isopropanol
(4) MS-33540, Safety Wiring, General Practice for
(5) SS-426-4491157, Bearing Assy Faired Mast
(6) SS-522-2477283, Mast Position Indicator Switch External Arrangement
(7) SS-522-4491153, Cable Guide Sheaves Assy.
(8) SS-404-1971417, Cable Loop Guards Installation Standard
(9) Navsea 0900-024-1060, Electrical Cable Adjustment Procedure

1-3 REFERENCES (Cont'd)

(10) SS-128-4398597, Antenna Closure Cap for Trident Class Ships
(11) NAVSEA SE110-B3-MMA-010, Procedure for Installation of Submarine Faired Mast Lifting Clamps

1-4 SAFETY PRECAUTIONS

a. Clamps. When directed, the antenna radome and the faired mast shall be secured with lifting clamps and restrainers of the proper size while working on removal or reinstallation of the antenna mast assembly. See reference (11) for guidance.

b. Hull Stop Valves. CLOSE and SAFETY-TAG the Trident OE-207A(V)/BR Antenna Mast hull stop valves (raise and lower) when working in the sail area.

II - SHIPBOARD INSTALLATION

2-1 GENERAL PRACTICES

Use caution when lifting the antenna mast assembly to prevent the fiberglass faired mast from striking against any object. Do not allow crane rigging to scrape against extended radome at any time. Keep all surfaces clean and free from burrs, nicks and gouges.

2-2 SPECIAL TOOLS REQUIRED

a. Three Faired Mast Lifting Clamps, SS-904-4398614, Pc. 2.
b. One Antenna Radome Lifting Clamp, SS-904-4398614, Pc. 6.

2-3 INSTALLATION PROCEDURE

Step 1. Remove side and aft bearing shoes including rubber parts from the upper and lower bearing frames. Keep all bearings identified for location. Do not mix any parts.

Step 2. Remove the antenna/mast assembly from the shipping crate and place it horizontally on two supporting chocks.

Step 3. Install lifting clamps on the faired mast. See Figure 3-1 and Ref. (11) for instructions.

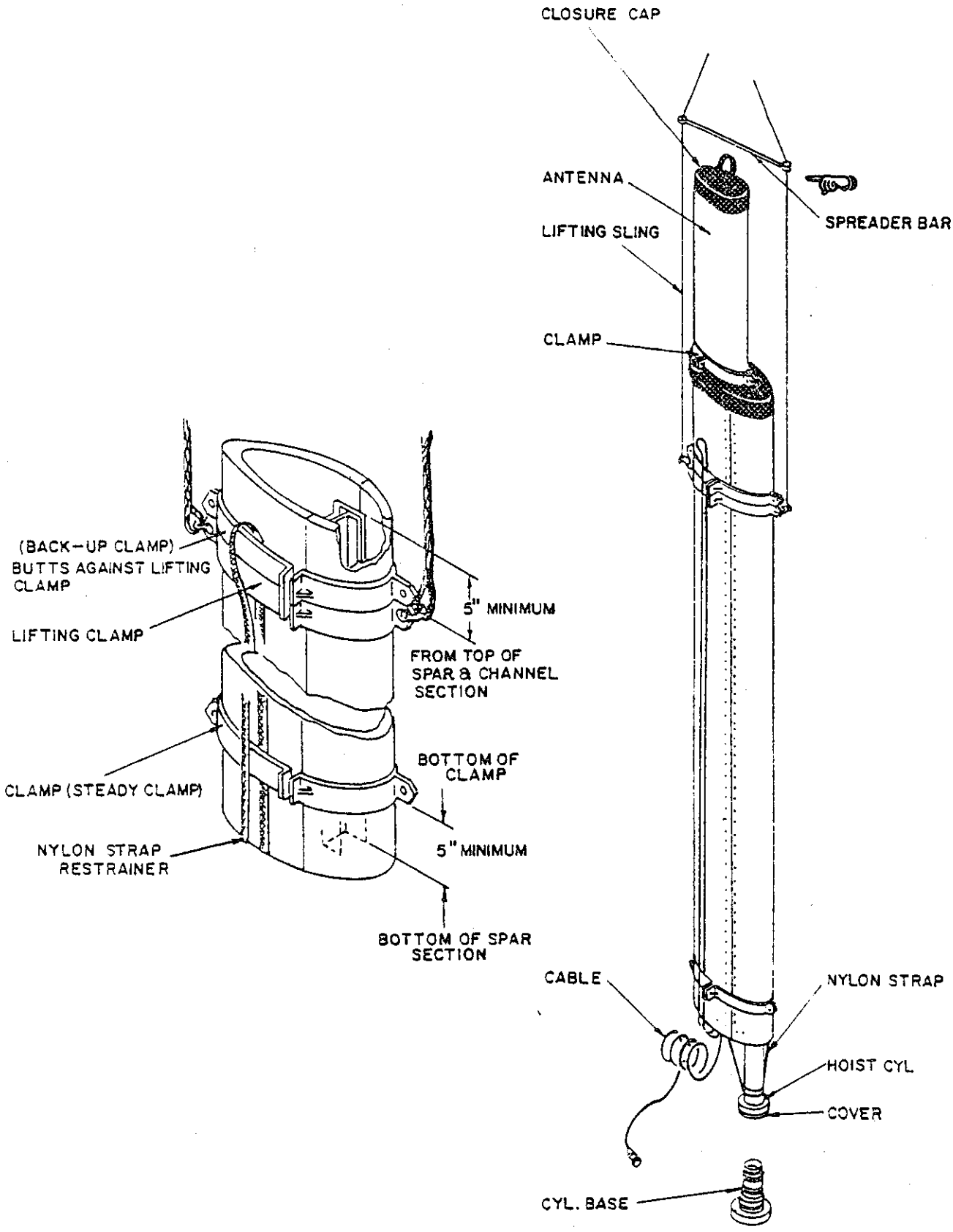


Figure 3-1. Safety Clamp Installation Instructions

NOTE

Protective cover plate on hoist cylinder must be loosened to break hydraulic or vacuum lock on cylinder so it can be extended. DO NOT remove the cover.

Step 4. Pull out the hoist cylinder 3 to 3-1/2 feet beyond the bottom edge of the faired mast. Install a clamp on the antenna (Ref. (1), Pc. 6) resting against the faired mast. This clamp prevents the cylinder from being retracted again.

Step 5. Restrain the hoist cylinder from downward movement during lifting operations by making fast a nylon strap secured to the lower cylinder flange, (between flange and small pipe fittings). Secure free end to a suitable anchor point at base of the faired mast. See Figure 3-1.

NOTE

Make no connections to the hoist cylinder cover plate.

Step 6. Secure the antenna cable to the lower faired mast lifting clamp. Tie a line to this clamp for guiding the antenna mast assembly during lifting operations.

NOTE

A crane with two independent lifting hooks is required to lift the antenna mast assembly properly.

Step 7. Attach crane lifting slings to the lower top lifting clamp and on the lifting clamp at the bottom of the faired mast crane-lift the antenna/mast assembly in a level position. Simultaneously raise the top of the mast while lowering the bottom of the mast until it is in a vertical position.

Step 8. Position the mast assembly about one foot above the sail opening. Untie and lower the antenna cable through the bearing frames and coil it on top of the hull. Remove lower lifting clamp and guide line from the faired mast.

NOTE

Install all upper bearing assemblies only when the bottom of the faired mast has entered the upper frame. All other bearings to be installed after the hoist cylinder is secured to the cylinder base. See paragraph 2-4 for bearing adjustments and Section I of this procedure for additional details.

Step 9. Carefully lower and guide the antenna mast assembly against the forward bearing and into the bearing frame assembly until the cylinder protective cover is 16 to 18 inches abcve the cylinder base flushing block.

NOTE

Cylinder base flushing should have been previously accomplished by ship's force or installation activity.

CAUTION

Assure that the hydraulic hull stops are CLOSED and DANGER-TAGGED for the multifunction antenna prior to removing cylinder base flushing block.

Step 10. Remove the cylinder base flushing block and examine base to ensure it is clean. (Clean surfaces with a lint-free cloth if required.)

NOTE

O-rings must be in their original sealed package and have no physical imperfections. Inspect all O-rings for cuts, gouges and imperfections before installation.

Step 11. Install pressure seal assemblies on cylinder base as shown in Figure 3-2.

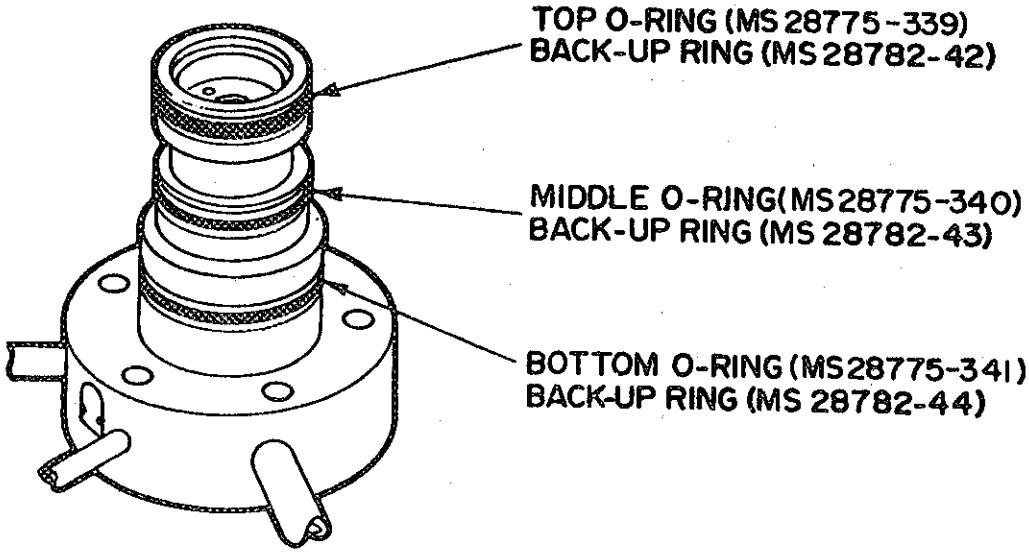


Figure 3-2. Cylinder Base

NOTE

Coat O-rings, back-up rings and metal interface with clean hydraulic system oil.

Cover cylinder base with a clean polyethylene (plastic) bag to preserve cleanliness.

Step 12. Remove protective cover from hoist cylinder lower flange and wipe off cylinder flange interface.

Step 13. Remove plastic bag from hoist cylinder base.

Step 14. Carefully lower the antenna/mast assembly with the crane, while guiding the hoist cylinder onto the hoist cylinder base. Secure the cylinder to the base with six 3/4" bolts and elastic stop nuts. Torque nuts to 110 ft-lbs. Remove nylon restraining strap from the hoist cylinder and bottom of mast.

CAUTION

At least two threads must show above top of installed elastic stop nuts.

Step 15. Install aft and side bearings in upper bearing frame.

Step 16. Slightly crane-lift mast assembly and remove the safety clamp from the extended antenna radome.

Step 17. Lower the mast assembly with crane until the upper faired mast lower lifting clamp is one inch above the top of the upper bearing frame assembly or structural interference. Restrain the mast assembly in this position with shoring and a hydraulic hand jack between bottom of the faired mast and top of pressure hull.

Step 18. Remove crane rigging and the two faired mast lifting clamps.

Step 19. Using a hydraulic hand jack, spacers, and shoring, lower the faired mast to the fully lowered position.

Step 20. Align tension scraper and grounding spring against external faired mast grounding strip. Secure and lockwire scraper and grounding spring to the bearing frame when rubber is compressed (deflected) 1/16 of an inch. See Figure 3-3.

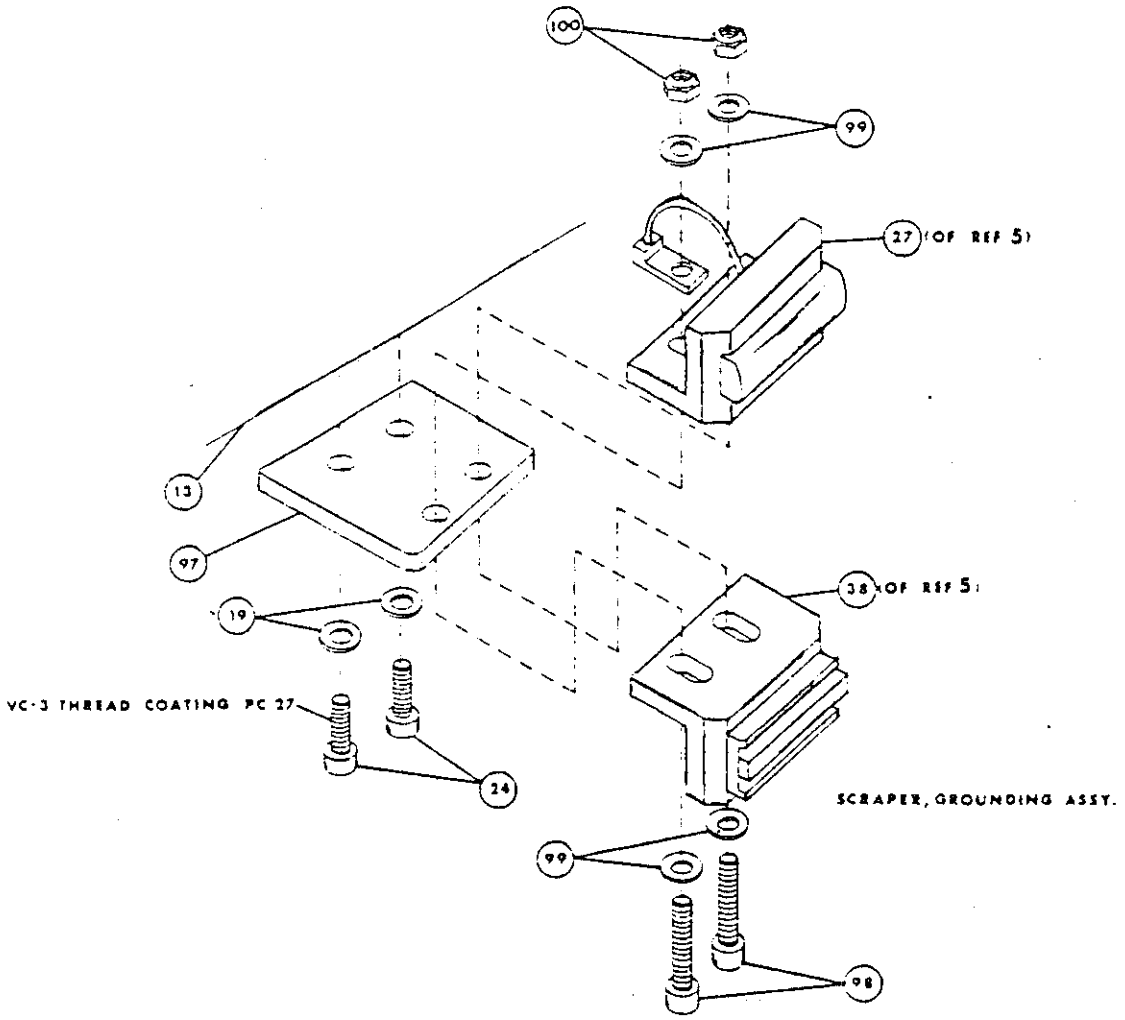


Figure 3-3. Grounding Spring and Scraper Assembly

CAUTION

Sail area to be cleared of personnel and any interference before performing the following steps.

Step 21. Open the following Trident **OE-207A(V)/BR Antenna Mast hydraulic** stop valves:

Supply-to-raise
Supply-to-lower
Leak-off

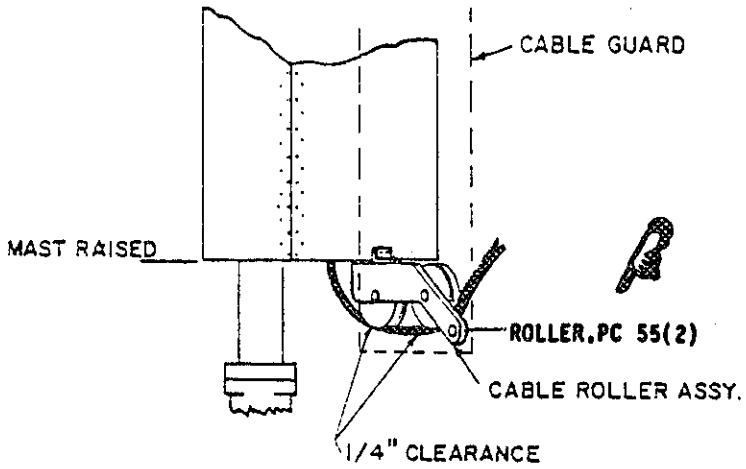


Figure 3-4. Cable Roller Assembly

Step 22. Carefully raise the mast assembly hydraulically to the fully raised position. (Guide electrical cable while mast is raised.) CLOSE and DANGER-TAG the hull stop valves with the raised position. Install mast clamps against the upper bearing frame for safety.

Step 23. Remove roller PC55 and reeve the antenna cable on the cable rollers, reassemble roller assembly and install on the bottom of the faired mast (see Figure 3-4).

Step 24. Set the cable loop in accordance with Ref. (9).

Step 25. A nominal clearance between the cable and the roots of the rollers is 1/4 inch at the point where the cable passes over the cable rollers. Secure antenna cable to cable guard roll-over and then pass the end of the cable back down through the cable panning/conduit to the hull electrical connector.

Step 26. Clamp the static portion of the antenna electrical cable guard (use Ref. (8), sheet 26 for guidance).

Step 27. Conduct a pressure test on the hull connector to assure the connector installation is watertight.

Step 28. Clean the hull fitting connector and cable molded plug connector. Make up the antenna electrical cable connector to the hull connector. Use new O-rings, AN6230-8 and AN6230-12, and lubricate lightly with DC-4 compound. See Figure 3-5.

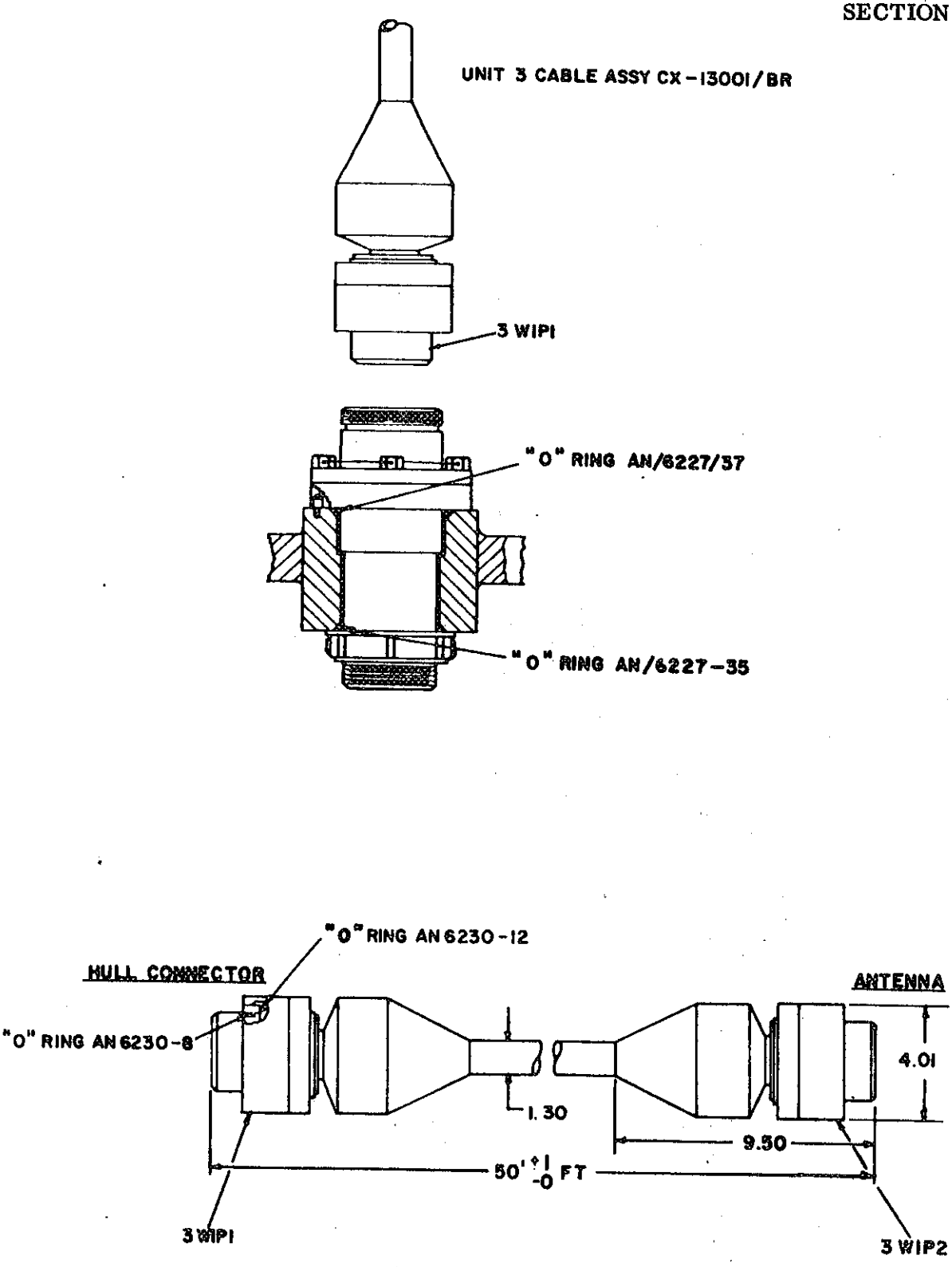


Figure 3-5. Cable and Hull Fitting O-Ring Assembly.

Step 29. Remove safety clamp from top of faired mast.

Step 30. Cycle the mast assembly and observe the antenna electrical cable in cable guard and around rollers for proper operation. If excessive antenna cable slack is observed, readjust cable. See Step 24.

Step 31. Vent the hydraulic hoist cylinder in accordance with ship's venting procedure. Adjust mast travel to fully raise or lower to 16 seconds.

NOTE

Mast travel time either direction not to exceed 30 seconds.

Step 32. Install magnetic switch for mast position indication by accomplishing the following: (Use Ref. (6) for guidance)

a. Install mast position indicator switch assembly (with cable attached) on the bearing frame.
b. Raise the mast assembly to fully raised position and align the switch to the faired mast magnet.
c. Lower mast assembly to fully down position and align the switch to the faired mast magnet.
d. Install conduit, then pull mast position indicator cable through conduit and make up cable connector to hull connector.

Step 33. Install the mast cap, Pc. 48, Ref. (9). Provide a uniform 5/8 inch side clearance between the faired mast and opening in the mast cap for installation of rubber seal. Dress up faired mast cap as required to obtain uniform clearance.

Step 34. Fair in top of mast and antenna caps to sail top contour.

NOTE

Faired mast to be fully down (retracted) position.

Modify Pc. 12, rubber seal, for Pc. 22 of Assy 47 only. Width to be reduced to 2-1/8" by cutting off 7/8" from bottom. Nylon strip, Pc. 13, will not be required for the removed portion.

Step 35. Remove the antenna cap, Pc. 22 and faired mast cap, Pc. 48.

Step 36. Layout, drill, mast cap, Pc. 48, Ref. (9), for installation of antenna radome rubber seal (detail D-9). Install 24 helicoils Pc. 3, around interior of closure cap. Secure rubber seal, Pc. 12, to closure cap with adhesive, Pc. 17, and with Pc. 13 and 24 screws, Pc. 4. Rubber to be flush with top of closure cap. With pocket knife cut (6) notches on each of the (3) lower projections of the seal as illustrated in Figure 3-6.

Step 37. Layout, drill and tap sail coaming for installation of rubber seal in accordance with Ref. (9) and Figure 3-6. Secure rubber to closure plate with primer, Pc. 19, adhesive, Pc. 18 and hardware. See details A-9, B-9 and E-9, Ref. (9). Rubber seal to be flush with top of closure plate.

Step 38. Reinstall the mast cap.

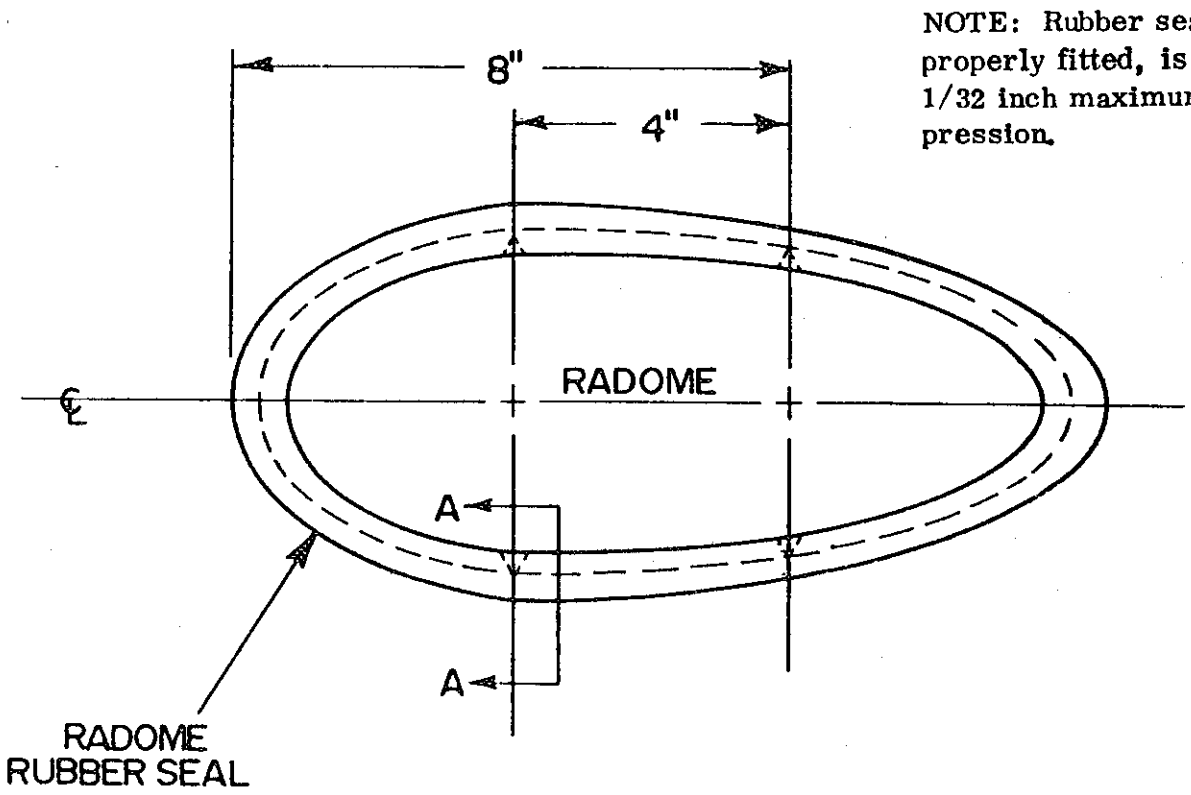


Figure 3-6. Antenna Radome Rubber Seal

2-4 ADJUSTMENT OF FAIRED MAST BEARINGS

This part of the procedure describes pre-setting the forward upper bearing assembly and the installation of all other bearing assemblies.

NOTE

The bearing frames are delivered fully assembled and have been fitted and aligned to the faired mast. No further adjustments are required unless:

(a) The faired mast has been repainted.

(b) The bearing frames are misaligned.

The faired mast has not been repainted and the bearing frames are properly installed.

Step 1. Remove the forward upper bearing.

Step 2. Measure the upper forward bearing crown thickness. Shim it to achieve a 1.500" $\pm$ 0.005" thickness. See Figure 3-7 for pictorial assembly of components and Ref. (5) for details.

Step 3. Obtain the faired mast largest fore/aft measurement from the instruction plate secured to the bottom of the mast.

Step 4a. When the measurement of Para. 2-4 (Step 2) is larger than 26.562", subtract the difference from 1.427" and this dimension will be the crown thickness of the after bearing assembly.

Step 4b. When the measurement of Para. 2-4 (Step 2) is smaller than 26.562", add the difference to 1.437" and this dimension will be the crown thickness of the after upper bearing assembly.

Step 5. Install the after upper bearing assembly.

Step 6. Install antenna/mast assembly.

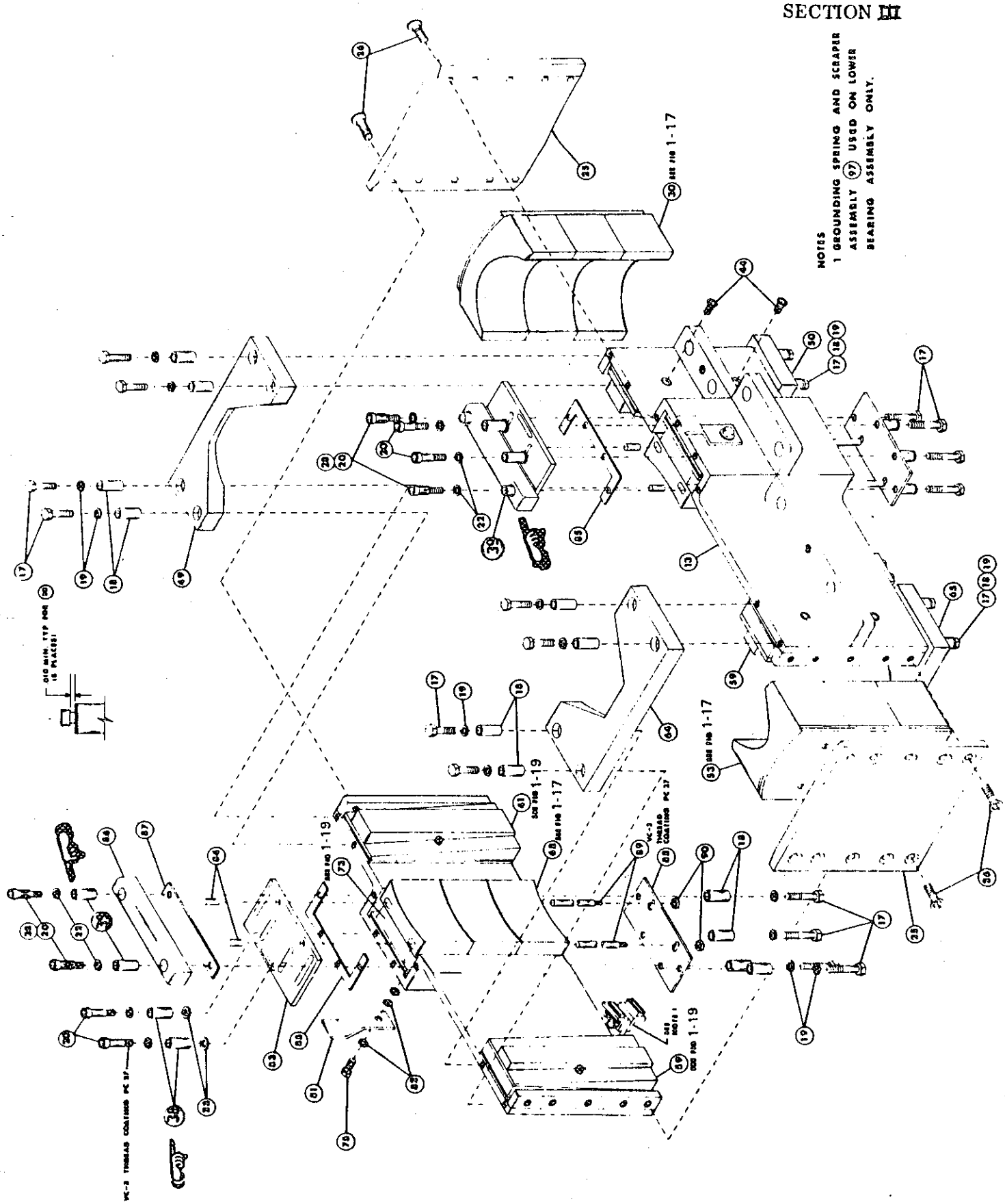


Figure 3-7. Bearing Frame and Mast Bearing Assembly

NOTE

The faired mast's largest fore/aft measurement has a (-) mark painted on the mast, also the distance from the bottom of the mast to the largest measurement is inscribed on the instruction plate secured to the mast's lower end. See Figure 3-8.

Step 7. Move the mast assembly until (-) mark is located at the lower bearing frame.

Step 8. Add or subtract shims to the forward lower bearing assembly until a 0.005" clearance exists between the bearing shoe and the faired mast bearing surface.

Step 9. Repeat Step 7 and install the lower aft bearing assembly.

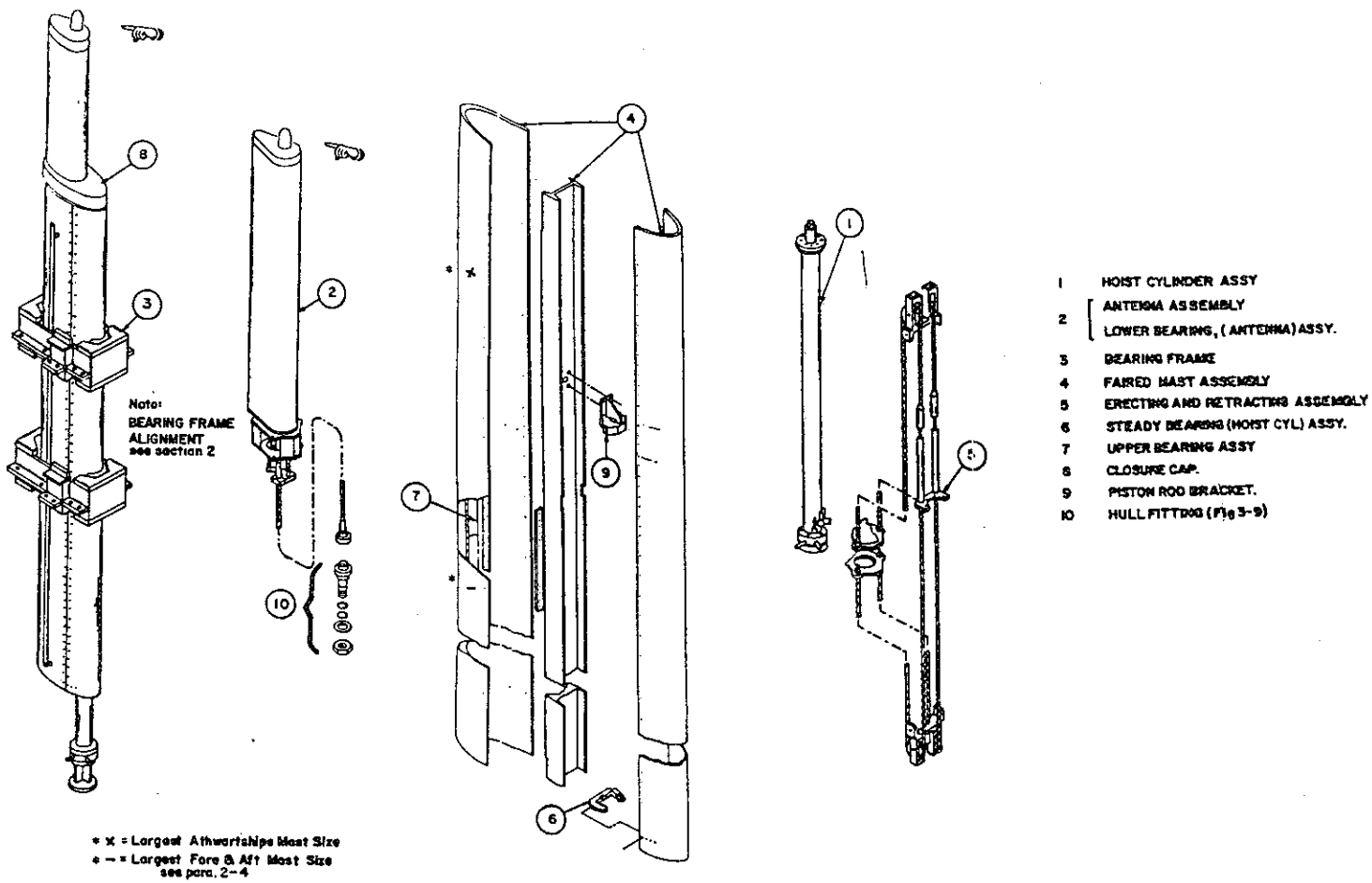
NOTE

The faired mast's largest athwartship measurement has an (X) mark painted on the mast, also the distance from the bottom of the mast to the largest measurement is inscribed on the instruction plate secured to the mast's end. See Figure 3-8.

Step 10. Move the faired mast until the (X) mark is located at the lower bearing frame and adjust the side bearing assemblies by shimming. Obtain the 0.005" clearance between the mast surface and bearing shoe.

Step 11. Move the faired mast until the (X) mark is located at the upper bearing frame. Repeat Step 9 for side bearing assembly adjustment.

Step 12. Water flush and then cycle the faired mast and inspect mast painted surface for wear, readjust bearings as necessary and adjust the speed of travel to a 9" per second rate of travel. Not to exceed 12" per second rate.



1 HOIST CYLINDER ASSY
2 [ANTENNA ASSEMBLY
[LOWER BEARING, (ANTENNA) ASSY.
3 BEARING FRAME
4 FAIRED MAST ASSEMBLY
5 ERECTING AND RETRACTING ASSEMBLY
6 STEADY BEARING (HOIST CYL) ASSY.
7 UPPER BEARING ASSY
8 CLOSURE CAP.
9 PISTON ROD BRACKET.
10 HULL FITTING (Fig 3-9)

Figure 3-8. Antenna Mast Assembly.

2-5 ANTENNA REMOVAL

Step 1. Raise the faired mast until the elongated slot in the mast's upper outer surface aligns with the cable locking fitting, Pc. 60. See Figure 3-9.

Step 2. Close the supply to raise, lower and leak off hull valves and then clamp the faired mast.

Step 3. Remove the antenna cable (electrical) from the hull fitting, cap off cable connector and hull fitting.

Step 4. Remove the cable from the cable guard and cable roller assembly at the bottom of the mast. See Figure 3-5.

Step 5. Install antenna clamp 18 inches above the top of the faired mast.

CAUTION

Do not attempt antenna removal in adverse weather as excess tension will be exerted on wire rope cables.

Step 6. Attach crane slings to the antenna clamp and remove slack from the crane lifting slings.

Step 7. Remove screw, Pc. 61, from the cable lock fitting, Pc. 60. See Figure 3-10.

Step 8. Remove locking device, Pc. 25 from the adjustable erecting and retracting sheave assembly.

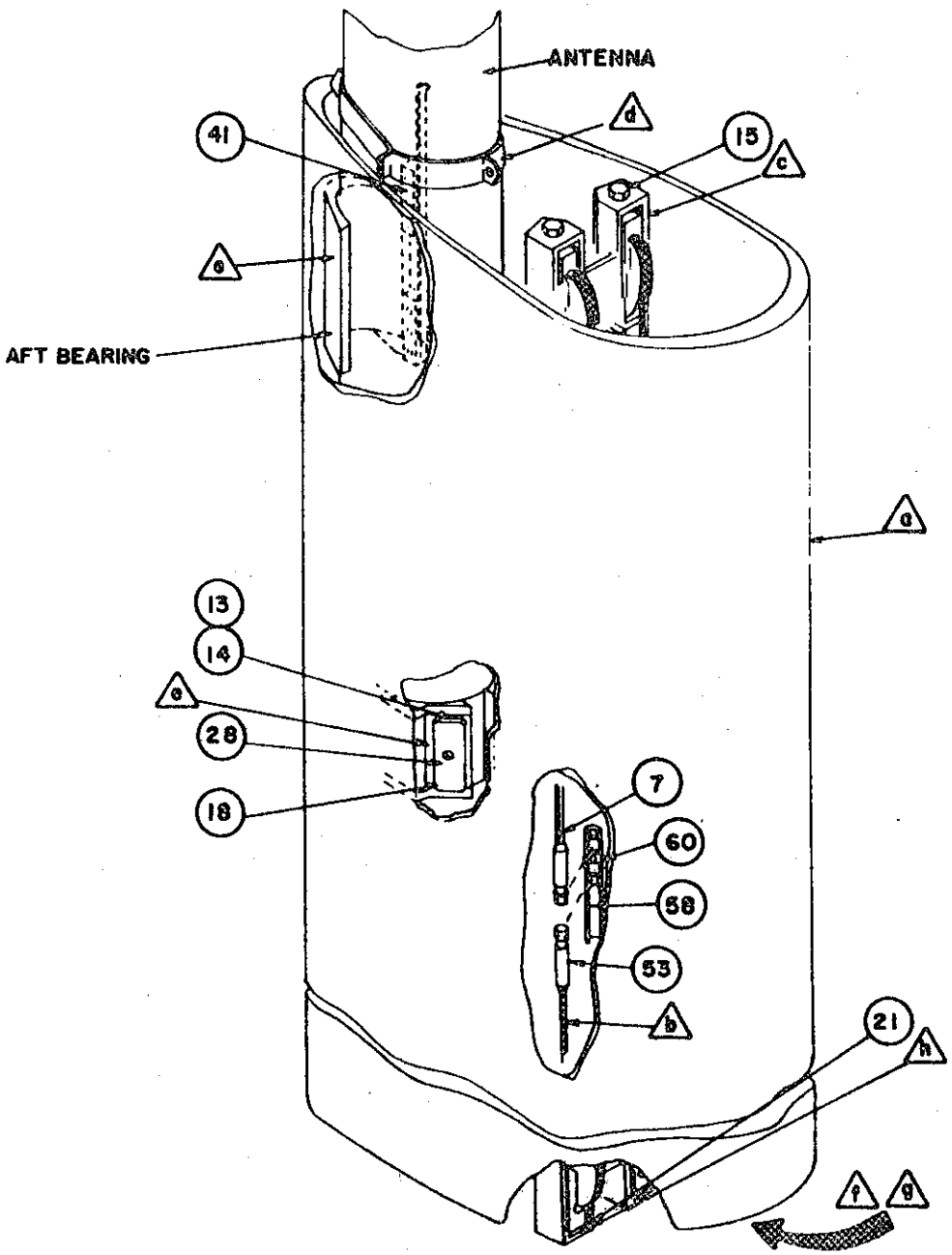
Step 9. Loosen each adjusting screw Pc. 15, and Pc. 21, an equal amount of turns and record for reassembly.

Step 10. Turn locking fitting, Pc. 60, counter-clockwise one half turn.

Step 11. Tie a marlin line to each cable fitting, Pcs. 7 and 53, and remove the cables from each end of the faired mast. Tape the marlin to the side of the faired mast.

CAUTION

Ensure that the after bearing or container do not slip down into the fairing.



REF.				
a	HITCO MAST ASSY	9000501	e UPPER BRG. ASSY	4491149
b	CABLE ASSY	4491151	f HYD. CYL.	4398602
c	ADJUST SHEAVE ASSY	4491158	g CABLE ROLLER ASSY	4491153
d	CLAMP	4398814	h LWR. RETRACTING CAB.	4491159

Figure 3-9. Upper Bearing Assembly and Cable Fitting Engagement.

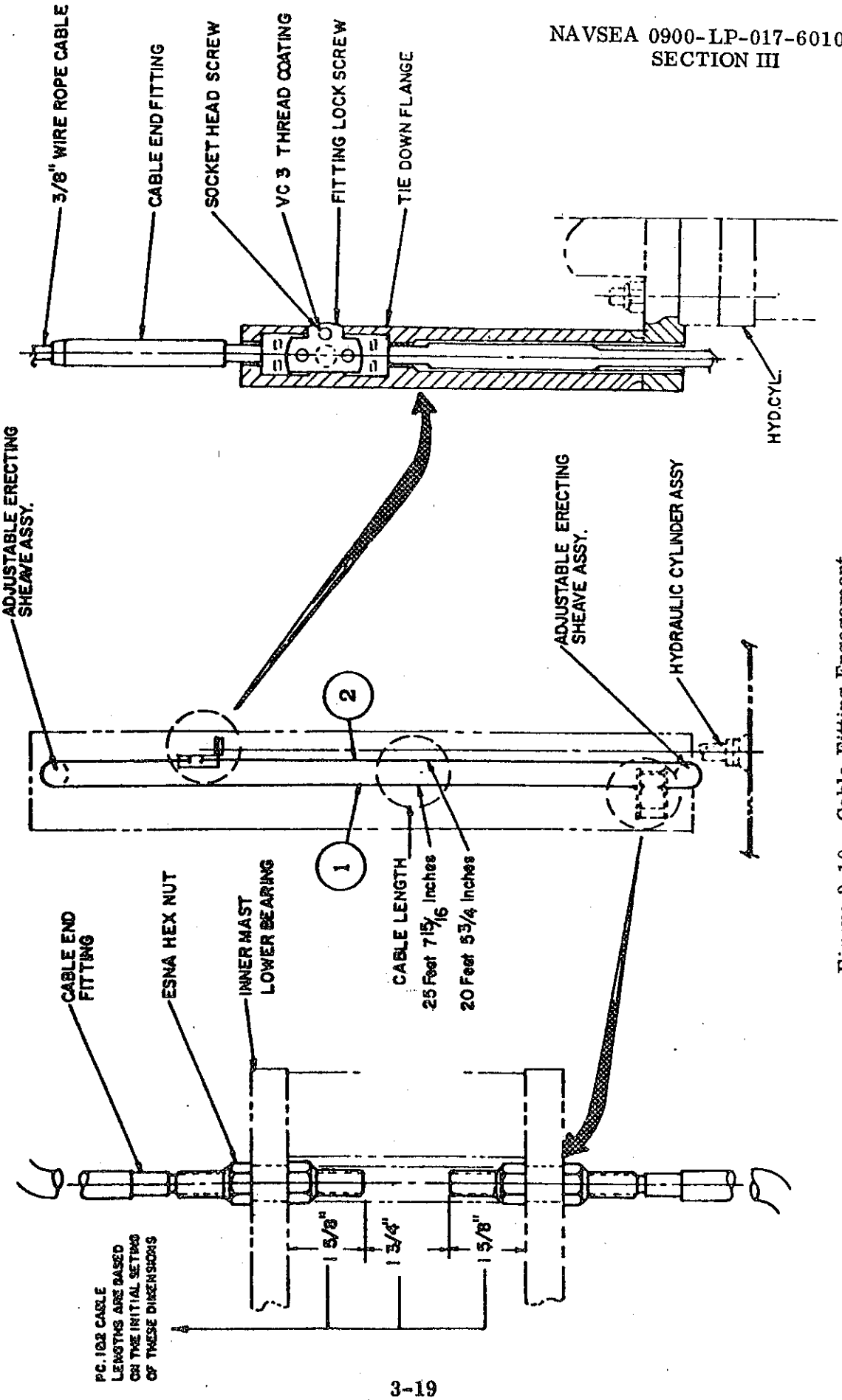


Figure 3-10. Cable Fitting Engagement.

Step 12. Remove the six screws Pc. 45 from each side of the faired mast and lift the two containers, Pc. 41 with upper aft bearing.

Step 13. Remove the forward bearing hex head screw, Pc. 13, slotted tab, Pc. 14 from the retainer plate, Pc. 12.

NOTE

Bearing shoe shall be clean of grease and dirt.

Step 14. Push antenna aft, place a 12 inch strip of tape full length of the forward bearings. Carefully lift out the forward bearing shoes Pc. 28 and remove spacers Pc. 18. (Tape is used to prevent dropping bearing shoe into the faired mast.)

Step 15. Slowly crane lift antenna from the faired mast. Keep all slack from erecting, retracting cables and place the antenna on protective covering on the pier.

2-6 ANTENNA INSTALLATION

Assemble in the following order:

NOTE

When wire rope cables were disconnected from the lower bearing assembly, follow Steps 1 thru 3.

Step 1. Place nuts, Pc. 9, on cable end fittings, Pc. 7, shown on Figure 3-10.

Step 2. Insert cable end fittings, Pc. 7, into lower bearing assembly 4. Adjust fittings with nuts, Pc. 9, to dimensions shown in Figure 3-10.

Step 3. Clamp antenna, Figure 3-1, coil and tie off all erecting, retracting and antenna cables to the lower bearing assembly, Figure 3-8.

Step 4. Crane-lift antenna over mast assembly and enter the antenna and retracting wire rope cables, Pc. 6, Figure 3-8, into the mast after section and take up all cable slack.

NOTE

Ensure all erecting and retracting screws, Pcs. 15 and 21, are backed off.

Upper bearing assembly shall be installed before tightening erecting or retracting cables. Figure 3-9

Step 5. Tie a marlin line to the erecting cable and reeve the cable, Pc. 6, around the adjustable erecting sheaves, Pc. 21, and down through the mast forward cavity to tie down flange, Pc. 58, Figure 3-10.

NOTE

A small hole is provided in the cable and fittings for a thin wire for guiding the lifting cables. A marlin line can be secured around the erecting/ retracting cables for lifting or guidance.

CAUTION

Check all cables prior to mast movement to ensure that they are not crossed.

Step 6. Place end of cable, Pc. 53, into the slot of the down flange, Pc. 58, Figure 3-10.

Step 7. Tie a marlin line to the retracting cable and reeve the cable, Pc. 6 around the adjustable retracting sheaves, Pc. 27, and up through the mast forward cavity to the tie down flange, Pc. 58.

CAUTION

Very slowly crane-lower the antenna until the wire rope cables are resting on the erecting sheaves. Do not have slack in the crane-lifting slings.

Step 8. Place cable fitting end, Pc. 6, into the slot of the tie down flange, Pc. 58.

Step 9. Turn lock, Pc. 60, clockwise until tight.

Step 10. Place VC-3 (thread coating) on screw, Pc. 61, and insert screw into lock, Pc. 60.

Step 11. Release the crane and remove the antenna clamp.

Step 12. Position lower bearing assembly 4, 26-1/2" from the bottom of the faired mast by tightening screws, Pcs. 15 and 21.

NOTE

Wire rope cable. Tension is 500 lbs.

Step 13. Maintain at least 1/2" clearance between clevis, Pcs. 11 and 17 and bracket, Pc. 4, Ref. b, Figure 3-7. Also maintain dimension, Step 2. When dimension is less than 1/2" readjustment of cable end fitting, Pc. 7 will be required.

Step 14. Place locking device over screws, Pcs. 75, 21 and apply VC-3 thread coating to screw 6 and install with washer, Pc. 7.

Step 15. Follow Steps 20 thru 30 for installation of the antenna cables, roller assembly and cable connection to hull fitting.

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